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Winning at Any Cost:
Doping in Olympic Sports

A Report by The CASA National Commission on Sports and Substance Abuse

September 2000

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* Dr. Wadler also served as a consultant in the development of Chapter III, The Pharmacology of Competition.

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Foreword and Accompanying Statement By Joseph A. Califano, Jr. Chairman and President

Open a newspaper or turn on the TV and you will find a story on drug use in sports. In their consuming ambition to win, too many athletes use a complex array of substances to enhance their performance--a practice that has come to be known internationally as doping. The CASA National Commission on Sports and Substance Abuse has found that in Olympic competition, the high financial stakes for athletes and their families, corporate sponsors, broadcast and cable industries and organizations that manage and govern sports put a big thumb on the side of the scale that encourages doping. Coaches, trainers, team mates and even parents share a win at any cost mentality that often encourages athletes to dope.

Along with big bucks involved, the explosion in performance-enhancing substances and lack of any effective and independent mechanism to police the use of banned substances in training as well as competition, threatens the integrity of Olympic Games.

While doping may help break records, hype games and sell products, it has a dark physical and moral underbelly. Unlike better gear, better nutrition or better training, ingesting and injecting performance-enhancing substances jeopardizes the health of athletes. Because athletes are second in importance only to parents as role models for children, doping by sports heroes also threatens the health of our children who follow the example set by elite athletes. This report sets out the compelling evidence of their adverse health consequences.

Doping perverts the meaning and core values of sport, undermines the legitimacy of competition and sends messages to our children that winning at any cost is the highest value. The practice of doping mocks the Olympic Creed: "The most important thing in the Olympic Games is not to

win but to take part, just as the most important thing in life is not the triumph but the struggle."

To better understand substance abuse in sports, the environment that promotes such abuse and the effects such abuse has on children, CASA created The CASA National Commission on Sports and Substance Abuse. This 15 member Commission chaired by University of Notre Dame President Reverend Edward A. (Monk) Malloy and composed of a distinguished group of citizen members, has been conducting the first extensive national analysis of the relationship between substance abuse and sports at the high school, college, professional and Olympic levels.

This initial CASA Commission report is the result of two years of intensive research. Its focus is on Olympic competition, primarily from the U.S. perspective. Subsequent Commission reports will examine substance abuse and American sports at the professional, collegiate and high school levels, explore methods of doping prevention and survey the attitudes and opinions of U.S. Olympic athletes.

The CASA Commission found that estimates of athletes' use of performance-enhancing drugs in Olympic sports vary widely--from less than three percent to more than 90 percent--depending on whether one asks organizations responsible for the sport, athletes, coaches or trainers. What most parties involved in Olympic Sports do agree is that doping is a serious problem for the Olympics and must be eliminated to preserve the integrity of the competition.

Since many of the drugs used do enhance performance, governing bodies in Olympic sport face a conflict of interest between two of their primary goals:

- Promoting sport, with its premium on breaking records to attract and hold sponsors and capture a world audience essential to financial growth; vs.
- Preserving the integrity of athletic competition by policing and sanctioning those who use banned performance-enhancing substances.

The crazy quilt of jurisdictions responsible for anti-doping policies and practices--the International Olympic Committee, International Sports Federations, National Olympic Committees, National Governing Bodies, the World Anti-Doping Agency created in 1999 to coordinate an international anti-doping program, and national anti-doping agencies, each with its own independent view--assure inconsistency in applying any rules. The aura of secrecy in which these bodies squirrel test results invites public cynicism about the integrity and the meaning of record-breaking Olympic performances. The absence of an independent international organization with no financial stake in sport and with authority to draft and enforce a consistent and fair anti-doping program is eroding public confidence in the Olympics.

Societies should celebrate athletic accomplishment as a triumph of human body, mind and spirit. Instead, societies seem obsessed with winning. Vince Lombardi told us "winning isn't everything--it's the only thing." A Nike ad put it this way: "You don't win the silver--you lose the gold." The legendary Knute Rockne cracked, "Show me a good and gracious loser and I'll show you a failure." If our children and athletes buy into this "win at any cost" philosophy, then for them the end of winning will justify any means, including doping.

Getting doping out of Olympic sports will require a determined and collective exercise of political will. All the players will have to put their oars in the Olympic waters: national governments, corporate executives, broadcasters, cable companies, coaches, trainers, parents and athletes. It will require the establishment of a truly independent organization with authority for doping control in Olympic sports. It is time for the Olympic players to come out of the maze of bureaucratic agencies and recognize and shed the conflicts of interest that have spurred increased doping.

Participants in the Olympic movement must step out of the darkness of secrecy that undermines credibility and take the world Olympic games into the sunlight of fair competition that truly measures human achievement unadulterated by performance-enhancing substances. This report provides recommendations to do just that.

The recommendations and the work of the CASA Commission stem from a recognition of the significance of the Olympic Games to the people of the world over many generations and the importance of maintaining the integrity of the Olympics as a model of achievement in fact and in appearance.

For the financial support that made this undertaking possible, the Board of Directors of CASA and our staff of professionals extend our appreciation to the White House Office of National Drug Control Policy, the Abercrombie Foundation and The Henry J. Kaiser Family Foundation.

Special gratitude goes to Monk Malloy for chairing this Commission, as he has so ably done for two previous CASA Commissions--*Substance Abuse and The American Adolescent: A Report by the Commission on Substance Abuse Among America's Adolescents* (August 1997) and *Rethinking Rites of Passage: Substance Abuse on America's Campuses, A Report by the Commission on Substance Abuse at Colleges and Universities* (June 1994). We are indebted for the time and effort put in by other Commission members and technical advisors. Margaret Mahoney, former President of The Commonwealth Fund, deserves mention for first bringing to my attention the importance of delving into sports and substance abuse and insisting that CASA take on this task. We also appreciate the time, expertise and candor of the individuals intimately involved with sports who met and spoke with Commission members and staff during the course of the Commission's deliberations. Their firsthand knowledge of sports and the issues surrounding doping in sports were invaluable, if often disturbing.

We wish to thank General Barry R. McCaffrey for his commitment to reducing doping in Olympic sports and his dedication to a drug-free society. We applaud his leadership and dedication and acknowledge the support and assistance of staff of the Office of National Drug Control Policy and consultants Dr. J. Michael Walsh and Scott H. Green. Attorneys from Dewey Ballantine, CASA's counsel, helped analyze the legal issues.

Donald S. Frederickson, M.D., former Director of the National Institutes of Health and former President of the Institute of Medicine, and Herbert D. Kleber, M.D., CASA's Executive Vice President and Medical Director, co-chaired the Technical Advisory Group to the Commission. Susan E. Foster, M.S.W., CASA's Vice President and Director of Policy Research and Analysis, is the principal investigator and staff director for this effort. They were ably assisted by CASA Research Associates Arsenio G. DeGuzman, Jr., M.P.A., and Darshna P. Modi, M.P.H. David Man, Ph.D., CASA's librarian, and library assistants Barbara Kurzweil and Ivy Truong were a big help. Jane Carlson, once again handled the administrative chores with efficiency and good spirit.

While many people contributed to this effort, the opinions expressed herein are the responsibility of The CASA National Commission on Sports and Substance Abuse.

Joseph A. Califano, Jr.

Chapter I
Introduction and Executive Summary

Since the beginning of the Olympic Games in Ancient Greece, athletes have sought competitive advantage through pharmacology. In the third century BC, Greek athletes ingested mushrooms in attempts to improve their performance.[1] Egyptians ingested the ground rear hooves of the Abyssinian mule for its purported performance-enhancing properties. Roman gladiators took stimulants to overcome fatigue while fighting in the famed Circus Maximus (circa 600 BC).[2]

In the second half of the 20th century, pharmacological advances and enormous leaps in biomedical research have created an opportunity for performance enhancement previously unimagined. In their consuming ambition to win, many athletes are taking advantage of this knowledge, often encouraged to do so by coaches, trainers, team members and parents. For the athlete, the win brings worldwide visibility and claims to big bucks. But the pharmacological competitive advantage may in fact be fools' gold, since it threatens the athlete's health and sends damaging messages to our children. For sports governing bodies, tacit approval of performance-enhancing drugs places their credibility in jeopardy. For society itself, what is at stake is the integrity and meaning of sport and the future health and ethical values of a generation of children.

This report is the result of two years of intensive research. To enhance its understanding of the biomedical aspects of performance-enhancing drug use in sport, the Commission formed a Technical Advisory Group (TAG). This advisory group was comprised of several of the foremost experts in the fields of sports medicine, exercise science, pharmacology and biomedical ethics. Dr. Donald Frederickson, former Director of the National Institutes of Health and former President of the Institute of Medicine, and Dr. Herbert Kleber, CASA's Executive Vice President and Medical Director, co-chaired the

TAG. The TAG's purpose was to advise the Commission on:

- How performance-enhancing substances banned by the sports leagues work in the human body.

- How, from a pharmacological perspective, athletes use banned substances to enhance performance and what they hope to gain.

- Potential side effects of performance-enhancing substances used by athletes.

- Reliability and validity of testing procedures and practices.

The Commission conducted an extensive review of relevant literature, held personal interviews and hearings with sports representatives and consulted experts in fields related to the use by athletes of performance-enhancing substances--a practice known in international sports competition as *doping*. The Commission reviewed more than 600 articles in the fields of sociology, law, medicine, pharmacology, toxicology, business and economics as they relate to sports. The backgrounds, histories and regulatory rules and practices of each of the sports' governing bodies were examined thoroughly. The Commission surveyed public and media reports (both nationally and internationally) on a daily basis to track developments related to performance-enhancing substance abuse in sports.

The result of this effort is the most comprehensive review to date of doping in Olympic sports.[*] Key findings include:

- While no one in the Olympic movement seriously advocates doping by athletes, the high financial stakes for Olympic athletes, corporate sponsors, the TV broadcast and cable industries and sports governing bodies,[†] coupled with the pharmacopoeia of performance-enhancing substances, the athlete's drive to win and the absence of an effective policing mechanism, create an environment that encourages doing anything--including doping--to win.

- Parents, coaches and trainers often join the rush for the gold, passively by turning the other way or actively supporting the use of performance-enhancing substances.

- National governments covet the gold as a source of national patriotism and pride and too often have turned a blind eye to means athletes use to attain the prize.

- Use of performance-enhancing substances in sport threatens the health of our athletes, the integrity and meaning of the sport and the health and ethical values of our children.

- Children mimic athletes through the ingestion of potentially harmful and dangerous substances. Athletes are second only to parents in the extent to which they are admired by children. Seventy-three percent of surveyed youth in a study by The Kaiser Family Foundation look up to and want to be like some famous athletes; 52 percent think that it is common for famous athletes to use steroids or other banned substances in order to get an edge on the competition.

- "Clean" athletes face three choices: (1) compete without using performance-enhancing substances, knowing that they may lose to competitors with fewer scruples;

[*] This report focuses on Olympic level athletes--also called elite athletes. These are athletes who are endorsed by the appropriate National Organizing Committee and/or International Federation to compete in world-class events, including the qualifying trials for the Olympic games. Olympic athletes are a sub-set of Olympic level athletes who qualify for the Olympic Games.

[†] The International Olympic Committee, the International Sports Federations, the National Olympic Committees and the National Governing Bodies.

(2) abandon their quest because they are unwilling to use performance-enhancing substances to achieve a decisive competitive advantage; or (3) use performance-enhancing substances to level the playing field.[3]

- Estimates of prevalence of doping in Olympic sports vary widely. The lowest estimates, believed substantially to underestimate drug use, come from the testing results of the governing bodies. These results suggest that less than three percent of athletes dope. Some veteran athletes put the figure closer to 30 percent and in cycling doping rates have been documented at 45 percent.[4] Some athletes, coaches and trainers believe that as many as 80 or 90 percent of athletes in some Olympic sports engage in doping.[5]

- The main performance-enhancing drugs used by Olympic athletes are anabolic steroids, stimulants, beta-2 agonists, human growth hormone, insulin-like growth factor and erythropoietin. Nutritional supplements--such as creatine, androstenedione or 19-norandrostenedione and beta-hydroxy beta-methylbutyrate (HMB)--also are used for performance-enhancement. Athletes may abuse nonperformance-enhancing drugs such as alcohol or marijuana.

- Athletes employ a variety of methods to beat drug tests including the use of diuretics, adulterants and catheterization.

- Because doping can help athletes break records and perform amazing feats, Olympic governing bodies face a conflict of interest between the goals of promoting sport, including the ability to attract and keep sponsors and capture a world audience, and of preserving integrity and meaning in sport by policing doping practices.

- Not withstanding the creation in 1999 of the World Anti-Doping Agency (WADA) to coordinate an international anti-doping program, there is no independent and accountable international organization with authority to create and administer an effective anti-doping program for Olympic sports--during training as well as during competition. The WADA has only authority to make recommendations to the International Olympic Committee (IOC).[6]

Getting doping out of sports will require the political will of all involved. The national governments must demand change and the creation of needed anti-doping standards and systems. To these ends, The CASA National Commission on Sports and Substance Abuse presents the following roadmap:

- **Participant nations--and the other key players--should demand that Olympic level athletes be free of performance-enhancing substances.** Nations must garner the political will to act in order to protect the health of athletes, preserve the integrity of sport and send positive messages to children. They must lead the way to build support for getting doping out of sports. Parents who organize and promote athletic events for their children should send clear messages against doping in sports. Current and former Olympic athletes should be enlisted to demand and support anti-doping policies. Coaches and trainers should set anti-doping standards and reinforce them with positive messages of substance-free competition. Corporate sponsors should show leadership by championing drug-free sports and by demanding that athletes be substance-free for the games they sponsor.

- **Participant nations should ensure that an independent international organization exists with authority over the methods of measurement and sanctions for doping in Olympic sports.** This organization would not report to the IOC or any sport governing body. It would have responsibility over the types of substances to ban; the types of tests to be conducted; the timing of those tests, the sample collection, analysis and reporting

processes; adjudication referral and adjudication. This organization should develop consistent standards for the detection of performance-enhancing substances and sanctions for their use, and assure consistent use of these standards and sanctions throughout the Olympic movement. The IOC should commit a percentage of its overall budget to support this effort.

- **Conduct research needed to determine long-term consequences of use of performance-enhancing substances.** Priorities for research to determine the long-term consequences of performance-enhancing substances include: the health effects of products that are sold as nutritional supplements, especially androstenedione, creatine and ephedrine; and the efficacy and long-term effects of steroid use, including precursor substances.

- **Expand and improve cost-effective testing.** Priorities to expand and improve cost effective testing include: an international collaborative effort, funded over a five-year period at a total of at least $50 million to $100 million, to find and develop reliable tests to detect the use of the major performance-enhancing drugs; inexpensive testing procedures for steroids; cost-effective methods to detect use of human growth hormone (hGH) and insulin-like growth factor (IGF-1); and methods of keeping pace with the development of new drugs as they emerge. Testing should be done on the basis of the best available technology, whether it is a test for a substance in the urine, blood, hair, sweat or oral fluids or is a test of the performance-enhancing effects of a substance. Research should be peer-reviewed to assure credibility and increase acceptability in the adjudication process.

- **Conduct comprehensive out-of-competition testing.** Comprehensive out-of-competition testing is essential to an effective doping program. Event or in-competition testing is useful for detecting substances that provide relatively fast-acting performance benefits for the user (e.g., stimulants to delay or reduce fatigue). However, many substances provide the greatest benefits to athletes when used during training (e.g., steroids to increase muscle mass). If only in-competition testing is used, athletes may cease using a banned substance in sufficient time to clear its metabolites from their systems. The only way to detect use of these banned training drugs is through a no-advance notice, out-of-competition testing program.

- **In the United States, strengthen the provisions of the Dietary Supplement Health and Education Act of 1994.** Athletes claim that they may unknowingly take banned substances in unlabeled or poorly labeled nutritional supplements. Congress should require manufacturers of dietary supplements to identify all contents and to label their products accurately. Concerns about youth mimicking athletes' behavior and ingesting substances which may be harmful or for which long-term effects are unknown provide another reason for Congress to act. Any claims of results now permitted under the Act related to structure and function should be supported by peer-reviewed research. Congress should consider regulating testosterone precursors as drugs rather than as nutritional supplements.

- **Adopt Athlete Passports.** A "doping passport"[*] [7] is an accessible and public history of an athlete's doping tests.[8] Health histories of athletes, with hormone levels, hematocrits and other data spanning several years can be incorporated into this document.[9] Such a passport could rectify the situation of athletes who are unfairly penalized for having natural hormone or other biochemical levels outside the range of what is considered normal (e.g., athletes

[*] Proposed by the IOC Athletes Commission which is responsible for acting as the mediator between active Olympic athletes and the IOC.

who naturally have a hematocrit over 50). Publically available passports would provide the type of open record necessary to help restore the integrity of sport.

- **Adopt a standard protocol for establishing the banned substances list.** To determine which substances to ban in Olympic competition, an independent organization should adopt an open and public process based on current scientific evidence and grounded in consistently applied rules. This process should be applied to new candidate substances as they are developed and eventually to the current list of banned substances in order to identify those to be added or removed.

Chapter II
What's at Stake?

Sports are among the most popular leisure activities in the world today. As a social institution, sports help to fill individuals' need for exercise, tension release, diversion and entertainment.[1] Sport is the play of the spirit, the challenge of the mind and the perfection of the body.[2] Sports are also avenues to fame and to fortune and engines to drive corporate profits. In Olympic sports, high economic stakes and chances for worldwide visibility compound the athlete's drive for competitive advantage. Winners secure tidy contracts for corporate product endorsements. These endorsements in turn increase corporate profits. To ensure these profits, corporations underwrite costs of the games securing their importance to the governing bodies of sports. These high stakes, coupled with the fact that sports are sources of national and international pride and patriotism, create an environment that encourages doping. But there are serious downsides. Use of performance-enhancing substances in sport threatens the health of our athletes, the integrity and meaning of the sport itself and the health and ethical values of our children.

The Role of Sports in Society

Americans' appetite for sports appears to be nearly insatiable. An estimated one-half of the United States population participates in various sporting activities regularly. In the United States, the number of spectators who attended sports events in 1995 reached 272 million.[*] [3] According to one study done in the United States, 62 percent of parents say that their children participate in organized sports. Seventy-five percent of American parents frequently encourage their children to engage in sports.[4]

[*] These events included professional baseball, basketball, football and hockey; college football and basketball; thoroughbred and greyhound racing; and jai alai.

Sports permeate virtually every social institution. Throughout countries worldwide, sports also are linked inextricably with other social institutions in a web of mutually reinforcing relationships. Sports socialize children and provide a source of family recreation. The family provides a source of players, parental encouragement and financial support through transportation, fees, and equipment. Sports are a source of school spirit and cohesion, an outlet for adolescent energy and an insulation against delinquency. Schools reinforce the importance of sports through trophies, rallies and assemblies, and provide a training ground for elite athletes.[5]

Sports provide profits for television, radio and newspapers; profits for manufacturers of sports apparel and equipment; and spin-off dollars for restaurants, bars, hotels and transportation. They also help feed the multi-billion dollar fitness industry (i.e., nutritional and dietary supplement manufacturers and distributors, and the publishers of fitness magazines). Corporations support sports by sponsoring teams or athletes, purchasing blocks of season tickets and manufacturing products with team emblems that pay back royalties.[6]

Sports reinforce patriotism and citizenship through flag raising, color guards and the national anthem. They also promote a sense of national identity, pride, belonging and unity. Sports are protected by antitrust exemptions, favorable tax laws and government subsidies to stadiums. Many political leaders endorse sports. Sports use team chaplains and reinforce traditional morality through the athletic creed. Churches sponsor athletic leagues and reinforce sports through the use of athletic metaphors in sermons and religious writings.[7]

Sports news often receives at least as much coverage as news about business, culture and public affairs. In the United States, on network television alone (i.e., not including cable service) sporting events constitute about 15 percent of all telecasts. In 1995, networks broadcast 2,000 hours of sports, and some cable providers (e.g., ESPN and ESPN2) broadcast sports nearly 24 hours a day.[8] Sports even have played a role in advancing understanding and goodwill among nations.

Olympic sports represent the epitome of athletic performance--the highest goal to which an athlete can aspire. But the medals of Olympic sports are tarnished by the practices of doping in all its forms. What drives athletes to participate in doping? What are the social and economic reinforcements to doping practices and what are its consequences?

What's at Stake for the Athlete?

Each athlete strives to improve performance by better training, better mental focus, better nutrition, better clothing, better gear. Increases in technology have made possible, for example, clothing that can reduce wind or water resistance and shave a few seconds off a race, or shoes that can increase the lift in a jump. Advances in our understanding of physiology enable us to develop training protocols and dietary plans to improve strength and endurance. From there it is just a small step to using nutritional supplements or drugs to accomplish even more significant performance advancements. Because of this inevitable search for improvement, some may argue that doping is conceptually no different than better gear or better diet.

> *I'm going to wear it till I die...Do I think it helped me get the world record? Yes. Do I think I would have gotten it without it? No. Do I think I would eventually get the world record without it? Yes. ...It feels like you're sliding through the water...You feel like I imagine a shark does.*[9]
>
> --Tom Malchow, elite level swimmer
> who set the world record
> in the 200 meter butterfly
> in June wearing a bodysuit

Doping, however, presents a much more complex issue. For example, unlike training, nutrition and better gear, performance-enhancing drugs may threaten the health and future well-being of the athlete and may encourage children to follow suit. As discussed in Chapter 3, The

Pharmacology of Competition, some performance-enhancing drugs are known to have adverse health effects; others have unknown effects. But many athletes, spurred on by coaches and trainers, family and friends and the lure of the win, disregard these potential effects and ignore the ethical questions their use raise.

One athlete's decision to use performance-enhancing drugs also exerts a powerful effect on the other athletes in the competition. As reported by *Sports Illustrated*, half of all recently surveyed Olympic athletes admitted that they would be willing to take a drug--even if it would kill them eventually--as long as it would let them win every event they entered five years in a row.* [10] This type of "win at any cost" mentality is pervading sports at all levels of competition and results in athletes feeling coerced to use substances just to remain on par with other athletes.

> *For two years, I took EPO, growth hormone, anabolic steroids, testosterone, amphetamine. Just about everything. That was part of the job.*[11]
>
> --Erwan Mentheour, Cyclist

Helping to drive this competitive rush is the lure of international acclaim and financial rewards. For some, the monetary values of these items can climb to millions of dollars long after the end of a race or competition. Thus, the potential for financial gain raises the stakes for athletes considerably. For example: medal winners in the Olympic Games and other international sports events receive worldwide attention and adulation and command lucrative endorsement contracts:

- **Lance Armstrong**, two-time winner of cycling's premier race, the Tour de France, receives $5 to $7.5 million annually from endorsements.[12]

- **Brandi Chastain**, a forward for the U.S. Women's Soccer Team that won the 1999 Women's World Cup, recently signed multi-year endorsement deals worth $2 million.[13]

- **Michelle Kwan**, Olympic figure skating champion, earned nearly a quarter of a million dollars in prize money during the past winter season, an estimated six figures in appearance fees, another six figures in endorsements, and more than $300,000 for skating in the Champions on Ice tour.[14]

- **Maurice Greene**, U.S. Track and Field star, saw his income quadruple between 1997 and 1998, and triple annually since then. In 1997, he earned about $300,000; he brought in $1.2 million in 1998 and more than $3 million in 1999. Additionally, he commands $100,000 a race in Europe; video-game maker Konami gave him $30,000 to place his likeness on the cover of its new Track and Field 2000 game; and Nike, Powerade and Home Depot either have signed or are actively recruiting him for endorsement deals.[15]

- **Marion Jones**, U.S. Track and Field star, earned more than $2.5 million in 1998. Her prize money totaled $850,000. Appearance fees and an endorsement contract with Nike comprised the remainder. According to sports marketers, she has million-dollar endorsement potential if factors like charisma, likability, and the winning of four or five Olympic gold medals were to come together.[16]

National Olympic Committees and National Governing Bodies offer extra incentives. For example, the U.S. Olympic Committee pays a bounty to athletes of $15,000 for gold medals, $10,000 for silver, and $7,500 for bronze. USA Swimming hands out $50,000 for gold medals,

* This survey of 198 Olympic athletes was performed by Dr. Robert Goldman during the 1996 Summer Olympic Games in Atlanta. Currently, Dr. Goldman is a sports medicine physician in private practice in Chicago. At the time of publication, CASA was unable to retrieve data or supporting documentation for these survey results from Dr. Goldman.

$25,000 for silver, and $10,000 for bronze. In 1996, U.S. swimmers took home more than $1 million in prize money from the United States Olympic Committee (USOC) and USA Swimming.[17]

The drive to win often starts early, with parents pressuring children to perform, even passively looking the other way or actively encouraging performance enhancement in all its forms. Coaches and trainers pick up the baton in elementary and high school, often promoting the use of performance-enhancing substances. Even nations, caught up in patriotism and national pride, often look the other way when it comes to doping.

> *We now have to face the reality that the Olympics constitute not only an athletic event but a political event.*[18]
>
> --Peter Ueberroth
> President of the Los Angeles
> Olympic Organizing Committee for
> the 1984 Summer Olympic Games

Athletes who engage in doping can be perceived as either villains or victims. From one perspective, most elite level athletes are autonomous adults capable of evaluating the benefits and risks of taking banned performance-enhancing substances. This view places the majority of blame for doping on athletes. From another perspective, athletes are part of a larger system that coerces them into doing whatever it takes to win, including the use of banned performance-enhancing substances. While not negating the responsibility athletes have for doping incidents, this view better reflects the circumstances of athletic competition.

Elite athletes often couple extraordinary natural gifts with intense discipline and commitment, usually forsaking a great deal of time and money in order to perfect their athletic abilities. When faced with the prospect of competitors holding an advantage based on their willingness to use performance-enhancing substances, athletes remain free to choose whether or not to violate the rules of sport as their competitors may be doing. They may not, however, retain their confidence that the best athlete will win.[19]

Athletes know that some of these substances do, indeed, enhance performance. They may believe that other substances have these effects even if objective evidence is lacking. Many substances are marketed to athletes as performance-enhancing even though little information of any type is available on their effects.

> *When I was young, I would always go up to guys and ask, "What kind of workouts do you do?" But this kid actually walked up and asked us what kind of supplements we were taking...What is this sport coming to?*[20]
>
> --Johnny Gray, four time Olympian and 1992 bronze medalist in track and field after being approached by a youth at the Los Angeles Invitational indoor meet last winter

"Clean" athletes are faced with three choices: (1) compete without using performance-enhancing substances, knowing that they may lose to competitors with fewer scruples; (2) abandon their quest, unwilling to use drugs to achieve a decisive competitive advantage; or (3) use performance-enhancing substances to level the playing field.[21] Paradoxically, the twisted consequence of this third option is the escalation of a pharmacological race that would ultimately result in no one gaining any competitive advantage, yet everyone suffering from the long-term effects of these substances. Even those who use performance-enhancing substances but stay just short of the technical line of cheating may run this risk.

What's at Stake for the Governing Bodies of Sport?

The athletes are only part of the doping puzzle. The administrative organizations governing international sports have an enormous stake in the outcome of athletic competition. These

organizations* have two fundamental goals: the promotion of sport, including the ability to attract and keep sponsors and capture a world audience, and the preservation of what is valuable and meaningful in sport by policing doping practices. These goals are not always compatible. Over the past three decades, the public has heard the governing bodies of Olympic sports repeat, reinforce and amplify their commitment to eliminating drugs from sport. Yet, persistent patterns of irregularities in enforcement raise serious doubts about the commitment of the sports' governing bodies to protect the interests of honest athletes, the virtues of sport and the health and safety of the competitors.

> *...once you start to pull on the thread of this [doping], the entire garment of the Olympic fabric begins to come apart....And what you begin to realize is the IOC itself has nothing to do with sport. It has to do with raising money and putting money in the IOC's coffers and the relationships it has with its major sponsors....*[22]
>
> --John Leonard
> World Swimming Coaches Association (1998)

Many athletes and others involved with international sport believe that the existing anti-doping systems (see Chapter 5, The Rules: Standards and Enforcement) are public relations tools, not effective counter-drug programs. Moreover, many athletes believe that these systems are run in such a way as to catch unknown athletes--but not stars or potential medalists.[23] A gap of confidence in the ability of the governing bodies in sport to prevent, detect and punish drug use in sport has emerged. Consider the following:

- At both the 1996 Atlanta Games and the 1984 Los Angeles Games, the IOC failed to act on a series of positive drug test results for banned substances among medal winners. During the Atlanta Games, only two positive test results were announced. However, in an interview with the *London Sunday Times*, Dr. Don Catlin, Director of the IOC-accredited laboratory performing the testing for these Games, stated that there were several other positive test results that the lab reported to the IOC. In each of these instances, lab officials reported that the samples were passed along to the Director of the IOC's Anti-Doping Program, Prince Alexandre de Merode. Prince de Merode has publicly stated that he discarded samples for unstated "technical difficulties." Neither the lab reports, the names of the athletes in question, nor the purported technical difficulties have ever been disclosed.[24]

- In separate interviews, scientists working to develop testing technologies for substances banned in sport state that "they were stymied by late decisions and a seeming lack of will at the highest levels of the IOC."[25]

- It is widely accepted that unannounced, out-of-competition testing is absolutely necessary to catch cheaters, yet as of August 14, 2000, two of the 28 international sports federations (i.e., the International Gymnastics Federation and the International Modern Pentathlon Union) had yet to agree to subject their athletes to out-of-competition tests in advance of the 2000 Sydney Games. A third (the International Volleyball Federation) had "delayed negotiations so long as to risk the implementation of a viable out-of-competition testing program in its sport before the Olympic Games."[26]

- In a 30-page deposition filed in July 2000 in the U.S. District Court in Denver, the former Director of the USOC's Doping Control Administration, Dr. Wade Exum, claimed that the USOC evaded its responsibility to screen and discipline athletes for drugs in its quest to produce medal-winners. He continued to state in his lawsuit that about half of the American athletes who have tested positive for prohibited substances have gone unpunished.[27]

* The International Olympic Committee (IOC), International Sports Federations, National Olympic Committees and National Governing Bodies.

In a personal correspondence to The CASA National Commission on Sports and Substance Abuse, Dr. Robert O. Voy, Director of the USOC's Doping Control during the 1980s, summarized the issues facing the governing bodies of sports by stating that they have two strong disincentives to test their athletes effectively. The first is financial. It is extremely expensive to conduct testing both in and out of competition. The high expense is a function of the necessity to use trained teams capable of performing unerring collection and processing and the high cost of laboratory analysis. Legal challenges also raise the financial costs of maintaining a drug-testing program.

The second incentive, according to Voy, is based on the need for a sports organization to look the other way regarding what athletes are doing to enhance performance. Financial support and the ability to attract and keep sponsors are based primarily on a sport's ability to excite and enthrall an audience. Should testing become too effective, sports may suffer because the climb to set new records may slow or plateau. Thus, to the extent that athletes' use of performance-enhancing substances raises the level of competition, contributing to the excitement and enthrallment of audiences, governing bodies face a conflict of interest in how to deal with their use.

> *The IOC doesn't want sponsors to be unhappy, and sponsors are unhappy any time their brand name is tarnished. That's why the IOC doesn't want the full extent of doping revealed.*[28]
>
> --John Leonard, Executive Director
> American Swimming Coaches Association

The IOC is dependent on corporate sponsorship and broadcast rights for an estimated 75 to 80 percent of its income.[29] The balance comes from supplierships, licensing, ticket revenue and collectibles (e.g., commemorative coins). The IOC itself retains about seven percent of total marketing revenues which it uses to run the Olympic movement. The balance, more than 93 percent, is distributed to:

- The Organizing Committee for an Olympic Game (OCOG), for administration and organization costs associated with the staging of the Games;
- The National Olympic Committees (NOCs), to help defray their administrative costs, including that of sending teams to the Games;
- The 28 Olympic Summer Sports Federations and the seven Olympic Winter Sports Federations, to assist in the continuing promotion of their respective sports; and,
- Various other sports organizations (e.g., the International Paralympic Committee and the Paralympic Organizing Committee).

The total value of Olympic marketing revenues for the quadrennium 1997-2000 is estimated to be in excess of $3.5 billion. Top level corporate sponsors pay an average of $50 million to sponsor the Olympics for four years. The top sponsors are: Coca-Cola, Eastman Kodak, VISA, Xerox, Sports Illustrated, Panasonic, McDonald's, IBM, UPS, John Hancock and Samsung. Nine of the top 11 sponsors of the IOC budget come from the United States. Coupled with broadcast rights fees, these companies represent nearly $1 billion in revenue for the Olympics each year.[30] With this much money at stake, the governing bodies are caught between their goals of preserving the meaning and value of sport and promoting sport. They have every incentive to minimize the appearance of doping while, at the same time, hyping the game and attracting and keeping sponsors.

What's at Stake for Corporate Sponsors?

Associating products with famous athletes often increases sales dramatically:

- Wheaties cereal boxes with Lance Armstrong's image sell about five to 10 percent better than its other boxes accounting for "millions" of dollars in

additional sales, according to **General Mills** spokesman Tom Johnson.[31]

- Following the debut of an integrated marketing campaign (i.e., TV and website) featuring Marion Jones using **Nike** shoes, Mike Wilsky, Nike's Vice President of U.S. Marketing, was quoted as saying that the shoe, the Air Cross Trainer II, "immediately shot to No. 1 in sales," outselling the second most-popular shoe by a 10-to-1 margin.[32]

- Bicycle manufacturer **Trek** splashed Lance Armstrong's name across its most expensive bicycle line--bikes that sell for up to $4,000 each--and sales more than doubled, says company President John Burke.[33]

- According to Senior Vice President Gail Sonnenberg, the **U.S. Postal Service** has snatched "millions and millions" of dollars worth of new business from rivals specifically because of its association with Lance Armstrong and sponsorship of the 19-member U.S. national cycling team.[34]

> *Everybody wants to know what I'm on. What am I on? I'm on my bike...six hours a day. What are you on?*
>
> --Lance Armstrong, two-time Tour de France champion in 30-second Nike ad

The incredible popularity of sports creates enormous marketing opportunities for corporations with television viewing audiences. Corporate sponsors spend millions of dollars in television advertising to leverage their sponsorships.

- Television companies in the United States paid $793 million for the broadcasting rights to the Sydney 2000 Olympic games. They have agreed to pay $2.3 billion for the broadcast rights for the 2004, 2006, and 2008 games. By comparison, U.S. broadcasting companies paid $400,000 for the broadcast rights to the 1960 Rome games and $401 million for the 1992 games.[35]

- European broadcasting companies, negotiating through the European Broadcasting Union (EBU), agreed to pay $350 million (US$) for the television rights to the Sydney 2000 games. By comparison, they paid $670,000 (US$) for the rights to the 1960 games in Rome, $1.7 million (US$) for the 1972 rights, $19 million (US$) in 1984, and $90 million (US$) for the rights to the Barcelona games in 1992.[36]

> *NBC expects to make a small profit from the Sydney Games. It is also looking to the event to boost its cable networks and attract a big audience to its fall lineup*.[37]

With the potential for profit so high, corporations exploit the public love of sports and of the winners in order to sell their products. The corporate goal is to heighten public interest in sporting events, promote the drive to compete, revere the winner, associate the winner with their products and cash in on the profits.

What's at Stake for Society and Our Children?

Because of the mutually reinforcing relationships among sports, the family, education, the economy, politics and religion, the impact and reach of sports in our society cannot be overstated. It is through these relationships that sports, in a very positive way, can help promote character building, discipline, competition, physical fitness, mental fitness, religiosity and nationalism--both on and off the playing field.[38] These relationships are reciprocal, however, and the negative aspects of sport (e.g., doping and the values and messages associated with this practice) can affect these other social institutions as well by undermining them and the values they hope to instill. Doping distorts the meaning of sport in society. It sends messages to our children that contradict the values we hope sports participation will evoke.

To the extent that our athletes are role models for our children, doping practices compromise our children's health and safety.

The Meaning of Sport

The Olympic Games have meaning that is well understood by competitors and spectators alike. Victory should go to the athlete with the best combination of natural ability, stamina, courage, strategic cunning and willingness to undergo intense and difficult training.[39] We admire great athletes for their strength, speed, skill, persistence, teamwork and whatever other forms of excellence that a particular sport allows them to reveal.[40] It is this excellence that gives meaning to individual athletic performances and to sports as a whole.

The Olympic Creed makes explicit the meaning of the Olympics by stating, "The most important thing in the Olympic Games is not to win but to take part, just as the most important thing in life is not the triumph but the struggle. The essential thing is not to have conquered but to have fought well."[41] In the face of these principles, doping by athletes grotesquely twists the meaning, essence and core values of sport and its practice undermines the legitimacy of any competition. Doping threatens the integrity of sport itself and all the potential benefits sports offer society, particularly its utility as a means of expressing and mirroring important social values.

Because athletes are permitted to use many forms of performance enhancement other than doping, some argue that anti-doping rules are arbitrary. To a significant degree, the rules in sports are indeed arbitrary, but they are in no way trivial.[42] The size of the playing field, the height of the net, or the number of players on a team are all artificially determined by the rules of the game. These rules create the structure in which athletes compete and, in doing so, help impart meaning to athletic performances. Toward that end, all Olympic athletes take an oath to "...take part in these Olympic games, respecting and abiding by the rules that govern them, in the true spirit of sportsmanship...."[43] As former Olympic athlete Dr. Angela Schneider stated in testimony before The CASA National Commission on Sports and Substance Abuse: "If you don't have fair play, you cannot have sport. Games are arbitrary; we throw together rules....If we don't stick to these arbitrary rules, we don't have a game..."[44] Fair competition presumes that the participants will follow all the rules, including those established in regards to doping.

Within the sports context, athletes are using these substances to achieve superhuman feats. Dr. Schneider further stated: "What has been happening in sport is that the technological advancements cut against our humanity....They treat the athlete like a piece of meat--like a performance machine."[45] Dr. Thomas H. Murray, a pre-eminent bioethicist from The Hastings Center, similarly argued that doping is a telling manifestation of the dehumanization of sport: "If everyone were allowed to use performance-enhancing substances, then everyone would be on a level playing field. Fairness would be accommodated, but such an allowance would detract from the meaning of sport. Sport should be about the pursuit of excellence and fairness but that pursuit should not be unlimited or unconstrained. We are, after all, human. Prohibiting the use of performance-enhancing drugs is an effort to preserve the meaning of athletic competition."[46]

Dr. Jay J. Coakley (a foremost expert in sports sociology), testifying before the Commission, described the phenomenon of overconformity to a sport ethic that entails making sacrifices for the game, striving for distinction, playing through pain and fighting through limits, even to the point of risking their safety and well-being as one of "positive deviance. "Coaches, trainers, and parents who subscribe to this positive deviance (either directly or tacitly) may even use their substantial influence to encourage the use of unhealthy and unfair practices, including the use of performance-enhancing substances. According to Coakley, " 'positive deviance' is not a 'positive' in a behavioral or health sense; in fact, it is dangerous to all athletes."[47] Even beyond just following the rules, doping cuts at the heart of what is meaningful about sport on a humanistic level.

Olympic Athletes as Role Models

> *The reason we are involved in this is the 52 million American children.*[48]
>
> --White House drug czar, Barry McCaffrey, at the IOC Doping Conference

A 1999 survey by The Kaiser Family Foundation found that famous athletes are the second most admired group of people by youth (parents are the most admired), coming in ahead of teachers and friends. Seventy-three percent of surveyed youth "look up to and want to be like" some famous athletes. Athletes are more admired than other famous celebrities like TV/movie stars (56 percent) or musicians/band members (32 percent).[49] These findings suggest that admiration by youth is not simply about fame and recognition, but also about heroic performers and the allure of winners.

Children claim that they gain motivation by following famous athletes. The Kaiser study revealed that by following famous athletes, 96 percent of children learned that excelling in sports takes hard work and dedication while 54 percent have been encouraged to work harder at their own sport. Children also see the negative aspects of athletes. In fact, 52 percent think that it is common to see famous athletes using steroids or other banned substances to get an edge on the competition. Of the boys surveyed, 35 percent had heard "a lot" and an additional 30 percent had heard "some" about Major League Baseball player Mark McGwire's use of androstenedione. Twenty-one percent of respondents had tried to change their body because of a famous athlete, either by slimming down or bulking up; five percent of the total respondents had tried to accomplish this by using a dietary supplement.[50]

The Canadian Centre for Drug-Free Sport (CCDS) conducted a survey in 1992 of high school and elementary students of knowledge, attitudes and behavior toward performance-enhancing substances. This survey found that of the students who use anabolic steroids, 53.9 percent use them to do better in sports while 47.2 percent report using steroids to change their physical appearance.[51]

> *More than a half million 8th- and 10th-grade students are now using these dangerous drugs [steroids], and increasing numbers of high school seniors say they don't believe the drugs are risky.*[52]
>
> --Alan I. Leshner, M.D., Director National Institute on Drug Abuse

Watching role models who are athletes use performance-enhancing drugs sends strong negative messages to our children. A former Olympic athlete testifying before the Commission observed: "Respect for the game entails respect for your opponents.... The culture in sport right now is totally antithetical to that. It is a culture that tries to pull down opponents using whatever means possible. It is not respectful to officials and it's not respectful to opponents. We've lost what used to be called etiquette. But it's not just about etiquette, it's about fundamental ethics and fundamental respect."[53]

In addition to the values we impart to our children, what is at stake is their health. The "win at any cost" mentality may be mimicked by younger athletes through the ingestion of potentially harmful and dangerous substances. A case in point is creatine--a popular dietary supplement. Creatine gained popularity following the 1992 Summer Olympics when several medalists admitted to using it, including Linford Christie and Colin Jackson. The problem with young adults trying to emulate these athletes is that the long-term effects of creatine (as many other performance-enhancing substances) are not known and the potential damage to growing bodies may be greater than in adults. Since creatine is considered a dietary supplement, it is not regulated by the Food and Drug Administration (FDA). Therefore, the purity and quality of creatine on store shelves vary.

Because creatine and other performance-enhancing substances are classified by the Federal Government as dietary supplements, they are viewed as safe. In the name of health and fitness, adults and youth are consuming growing quantities of substances. According to one report, over 56 percent of the U.S. adult population uses some form of vitamins, supplements or minerals.[54] Sports nutrition appears to be the rising wave in the nutritional supplements field. In the past, this category was perceived mainly as a niche sector dominated at the retail level by health food specialty stores. At present, large quantities of these substances are readily available for purchase anywhere. For example, one need only go to the vitamin section of a local wholesale club (e.g., Wal-Mart) to purchase a two-pound container of creatine or other similar products.

In 1996 the American public purchased 1.2 million kilograms of creatine. By 1998 consumption had risen to nearly 4 million kilograms....with personal endorsements from stars like the Baltimore Orioles' Brady Anderson and Denver Broncos' John Elway, interest in creatine is unlikely to wane.[56]

Whole new methods of marketing, research and distribution have arisen to cash in on the sports and performance enhancement industry. Manufacturers and distributors of dietary supplements no longer sell their products only through retail stores but also advertise heavily on the Internet and in specialty magazines. These specialty magazines promote these products in the name of health and fitness, all to the tune of millions in profits. Nutrition stores display extensive arrays of dietary supplements with performance-enhancing claims.

- General Nutrition Companies, Inc. (GNC), which has 4,203 stores in all 50 U.S. states and 25 foreign markets, had 1998 profits of $90 million on sales of $1.4 billion. It has formed alliances with Rite Aid Corp. drug stores and Internet retailer Drugstore.com, Inc.[57]

The sports nutrition market is worth $1.4 billion a year and is expanding at a rate of 22 percent.[55]

--Brent Scott, Vice President of Sales
Experimental & Applied Sciences, Inc.

- Experimental & Applied Sciences, Inc., a Colorado-based manufacturer of performance-enhancing supplements that enjoys a high profile among professional athletes, reported annual sales of more than $150 million.[58]

Not only are we looking the other way when it comes to performance-enhancing substances and youth, we are marketing these products to them directly. Even substances that may not be damaging in a fully developed athlete may have serious consequences for a child or teen who is still growing.

Chapter III
The Pharmacology of Competition

Athletes are playing a dangerous game when they use performance-enhancing substances to gain competitive advantage. Many of the substances they use produce adverse health effects; for others the effects are still unknown. Performance-enhancing substances are: any substance, either natural or synthetic, foodstuff or supplement, legal or illegal, that when introduced into the human body gives the user a competitive advantage, i.e., allows one to perform at a level beyond one's natural abilities. The CASA National Commission on Sports and Substance Abuse has identified the performance-enhancing drugs currently used in sports, the reasons why athletes may use them, the known side effects of these substances and the current state of technologies available to detect them. We also have identified nonperformance-enhancing drugs banned in Olympic competition, dietary supplements that may be performance-enhancing and agents used to mask or beat a drug test.

> *A society's recreation is charged with moral significance. Sport - and a society that takes it seriously - would be debased if it did not strictly forbid things that blur the distinction between the triumph of character and the triumph of chemistry.*
>
> --George Will
> October 1988

Performance-Enhancing Drugs

Anabolic Steroids

The anabolic steroids used by athletes are synthetic derivatives of the male sex hormone testosterone. Testosterone is responsible for the development of primary male sexual characteristics. Anabolic steroids are distinguished from the corticosteroids, such as cortisone which break down tissue.

Biochemical/Physiological Effects. Anabolic steroids act by binding to specific receptors

inside a cell to enhance or inhibit the expression of specific genes.[1] Female use of anabolic steroids results in development of male secondary sex characteristics.[2] Males who use these drugs not only become stronger, but may develop acne and/or abnormal breast tissue.[3] In adolescents, anabolic steroid use promotes an initial acceleration in skeletal and muscular growth; however, premature closure of the long bone growth centers may eventually stunt the user's growth.[4]

Therapeutic Uses. Therapeutic-uses of anabolic steroids include testosterone replacement for men because of disease, surgery, radiation or trauma and treatment of a rare hereditary disorder.[5] Anabolic steroids have been found to help HIV-positive patients with AIDS wasting syndrome regain body weight, muscle strength and lean body mass.[6] Testosterone replacement therapy is being tested in aging men to combat the natural decrease in testosterone that occurs with aging and thereby restore muscle strength, muscle mass and bone mass.[7]

Effects on Athletic Performance. Athletes use anabolic steroids to achieve increases in muscle mass and strength and/or to improve recovery from training by decreasing tissue breakdown.[8] Numerous studies have addressed the issue of the effect of anabolic steroids on bulk and strength. While earlier research was not definitive,[9] several recent studies have concluded that steroid users do become stronger and gain size.[10]

The standard used for assessing the efficacy of anabolic steroids has been their effect on an athlete's ability to increase the maximum weight lifted in a single repetition of a lifting exercise. How this benchmark correlates with actual performance in a variety of competitive sports (other than weightlifting) remains highly speculative. Little data are available regarding the effects of anabolic steroids on motor coordination and reaction time.

Athletes often use anabolic agents at doses much higher than prescribed for therapeutic purposes.[11] Due to potential harmful side effects of steroid use at excessively high dosage levels, clinical studies, in the past, examined their effects on athletic performance at relatively low dosage levels and the results were equivocal.[12] However, a 1996 found that high doses of testosterone, especially when combined with strength training, increase fat-free mass and muscle size and strength in normal men.[13]

Several case studies have documented aggressive behavior following steroid use and many other studies have found that steroid users report feeling more aggressive.[14] Other studies have found no behavioral changes at all due to steroid use.[15]

Dosage, diet, training and the type and duration of anabolic steroid used are all known confounding variables when attempting to determine significant differences in anabolic steroid effects.[16]

Potential Adverse Effects. Adverse effects of steroid use include: liver function abnormalities, liver tumors, testicular atrophy, development of abnormal breast tissue in males, masculinizing effects in females (increased body hair, deepening of voice), decreased "good cholesterol" and increased "bad cholesterol."[17] Behavioral changes, psychiatric disorders and drug dependence may occur.[18] Injection users may run a higher risk of infectious diseases (specifically hepatitis B, hepatitis C and HIV infection) by sharing contaminated needles.[19]

Testing. Classically, anabolic steroids have been detected using a technique known as gas chromatographic mass spectrometry (GC/MS).[20] This technique is the most reliable and valid means generally accepted for the accurate detection of anabolic steroids in the urine. Recently, technological advances using the more sensitive high-resolution mass spectrometry (HRMS) have enabled the detection of the substances at much lower concentrations. HRMS was introduced at the Atlanta Games. Its newness, however, led to the discarding of test results over concerns regarding the legal defensibility of the findings. With time and refinement, this technology is expected to become the gold standard for detecting steroid and other drug abuse.[21]

A more complex problem is that of distinguishing between testosterone in the urine that is present normally and testosterone that is administered by injection, patch, cream or gel. The current test is predicated upon the biological observation that normally for every molecule of testosterone (T) produced in the body there is an expected amount of the related epitestosterone (E) also produced.[22] Most individuals produce in their urine one molecule of T for every molecule of E, resulting in a ratio (T/E) of approximately 1.[23] Because of genetic variations, some individuals normally have ratios as high as 6:1.[24] Until such time as a more acceptable method for distinguishing natural testosterone from self-administered testosterone, an elevated T/E ratio is used as a marker of abuse.[25]

There are several problems associated with this approach. For example, nearly eight in 1,000 individuals normally have a T/E ratio greater than 6:1.[26] Second, there is no peer-reviewed literature validating this ratio in women, particularly in relation to the menstrual cycle and use of birth control pills. This point has been the subject of much litigation. Third, self-administering both testosterone and epitestosterone allows individuals to dope but still keep their T/E ratio below 6:1. Promising studies are under way to develop the means to distinguish between natural testosterone and synthetic testosterone by analyzing the carbon isotope of each of these substances.[27]

Further complicating the testing for steroids is the realization that an abnormal finding in the urine does not equate always with self-administration of a banned substance. For example, sabotage, i.e., spiking another competitor's food or drink with a banned substance, can produce a positive urine result. While athletes have claimed to be victims of such sabotage, there are no data documenting how frequently it occurs.

Some steroid users may attempt to avoid detection by using a drug called Probenecid. In animal studies, this substance has been shown to interfere with the excretion of some steroids.[28]

Since anabolic steroids are training drugs, they are not typically taken during competition, the only meaningful test for steroid abuse is year-round, out-of-competition, unannounced testing. The associated costs and logistical problems are significant. In-competition athletic drug tests currently cost $300 to $500 per test. At the 2002 Winter Olympics, officials estimate that analysis of each urine sample will cost $700 to $1000 exclusive of any testing for peptide hormones (i.e., hGH, IGF-1, EPO) and that $3 million will be spent on urine collection, transportation and analysis for less than 1,000 samples.[29] Out-of-competition testing raises these already high costs appreciably.

The recent spate of positive tests for the steroid nandrolone underscores how complex the subject of steroid testing has become.[30] Nandrolone can appear in abnormal quantities in the urine as a consequence of Deca-Durabolin abuse or as a consequence of the metabolism of the dietary supplement, 19-norandro-stenedione.[31] Deca-Durabolin is an injected anabolic steroid and controlled substance which, if used, indicates unequivocal intent to gain an unfair competitive advantage. 19-norandrostenedione is a dietary supplement that can be taken with intent or unknowingly in a mislabeled bottle bought over-the-counter. This raises the question of how to distinguish use with regard to intent in the case of a positive test result.

Stimulants

Stimulants increase alertness, reduce fatigue and, therefore, may increase competitiveness. They include the amphetamines, the sympathomimetic amines (e.g., pseudoephedrine), cocaine and caffeine. These drugs all produce the telltale signs of nervousness, irritability, insomnia, palpitations, weight loss and mild hypertension. In 1970, amphetamines accounted for 14 percent of all psychoactive drugs prescribed by physicians in the United States, often for weight control.[32]

The widespread abuse of these drugs, including in professional sports, led to the passage of the Controlled Substances Act of 1970 (CSA).[33] It

was soon discovered, however, that the sympathomimetic amines (which are not covered by the Controlled Substances Act) when combined with caffeine mimic the effects of amphetamine.[34] Such combinations became known as the "look-alikes" and allowed athletes to circumvent the intent of the CSA. The ubiquity of these drugs has presented particular problems in the world of sports, especially since each component of the "look-alikes" can be readily obtained and mixed.

Amphetamines

Biochemical/Physiological Effects. Amphetamines elevate blood pressure and initially slow the heart rate. Amphetamine use causes wakefulness, alertness, decreased sense of fatigue, elevation of mood, increased initiative and self-confidence, an increase in motor and speech activity and a decreased appetite.[35] Tolerance to these effects occurs with repetitive use, leading to continued increases in the dosage of amphetamines in an attempt to achieve the same effect.[36]

Therapeutic Uses. The legitimate therapeutic use of amphetamines has become increasingly narrow. They are used for childhood hyperactivity, attention deficit disorder, as an adjunct in chronic pain patients taking opiates, and for certain central nervous system diseases (e.g., narcolepsy) to overcome drowsiness/sleepiness.[37]

Effects on Athletic Performance. The amphetamines became popular with athletes because of their ability to delay the onset of fatigue during intense exercise, to reduce weight and to increase concentration. A landmark study done in 1959 demonstrated enhanced performance in 75 percent of the runners, swimmers and throwers taking amphetamines.[38] Since then, available evidence suggests that amphetamine use can enhance athletic performance, including speed, power, endurance, concentration and fine motor coordination.[39]

Potential Adverse Effects. Amphetamines produce acute effects such as restlessness, irritability, insomnia, headache, palpitations and anorexia. An irregular heartbeat or palpitations may result with abuse. Severe effects can include confusion, hallucinations, convulsions, cerebral hemorrhage, heart attack and circulatory collapse. Addiction and weight loss can result from chronic abuse.[40]

Testing. Amphetamines are absorbed rapidly into the circulation, with blood levels peaking in one to two hours. The clinical effects can appear within half an hour and can last in excess of three hours.[41] Although the amphetamines are readily detectable in urine, laboratory testing is complicated by the close chemical similarity to sympathomimetic amines. Laboratory testing may have to include testing for the different forms of amphetamine and methamphetamine to insure accuracy of drug identification.

Amphetamines are "time of event" drugs used at the time of competition rather than drugs used during the time of training for athletic performance enhancement. Out-of-competition testing for these drugs is therefore less relevant. The period of detection of amphetamines in urine by GC/MS is up to five days after last use.[42] Testing for amphetamines is covered in the average cost of an in-competition test (i.e., $300-500 per test). This type of screening also can detect Ecstacy, a popular amphetamine-like designer drug. Other designer drugs that function as stimulants are constantly being developed, challenging the ability of testing to keep pace.

Sympathomimetic Amines

Biochemical/Physiological Effects. Similar to amphetamines, these drugs raise blood pressure,[43] increase the heart rate and dilate the air passages in the lungs.[44] High doses may be associated with euphoria and increased alertness.[45]

Therapeutic Uses. The sympathomimetic amines are widely available as over-the-counter (OTC) cold remedies. They are also used to treat seasonal allergies and related respiratory disorders. Ephedrine, in years past, was widely used in the treatment of asthma.

Phenylpropanolamine is a common ingredient in diet pills.

Effects on Athletic Performance. These drugs are believed, by many athletes to produce effects similar to those of amphetamines. Ephedrine use by swimmer Rick DeMont in 1972 caused the first United States Gold Medal to be forfeited in Olympic competition.[46] There is a lack of scientific documentation, however, of actual enhancement of performance directly related to the use of these drugs as stimulants. A common use for ephedrine, when used in combination with caffeine, is to decrease body weight and thereby enhance performance.[47]

Potential Adverse Effects. Sympathomimetic amines produce side effects similar to amphetamines, including nervousness, irritability, dizziness, palpitations and mild hypertension. Severe effects can include agitation, confusion, hallucinations, stroke, cerebral hemorrhage and severe hypertension.[48]

Testing. The sympathomimetic amines are detectable in urine with the same methods and detection windows relevant to amphetamines. In an attempt to separate legitimate therapeutic use (e.g., medication for upper respiratory infection with an OTC decongestant) from abuse, the IOC and the International Federations raised the tolerance levels for the sympathomimetic amines.

Cocaine

Biochemical/Physiological Effects. Cocaine is derived from the leaf of the coca plant. Cocaine hydrochloride is the form of cocaine that is either inhaled or injected. Free base cocaine and "crack" decompose at a higher temperature and thus are smoked. Cocaine use produces constriction of blood vessels, increased heart rate, dilated pupils and increased body temperature. Its effects also include increased alertness and energy, decreased fatigue, increased sense of well-being, loquaciousness, repetitive behaviors, loss of appetite and intense euphoria.[49] These effects are brief and generally last less than 30 minutes.[50] Cocaine increases concentrations of certain neurotransmitters such as dopamine which is responsible for much of the euphoric effect.[51] The potent "high" of cocaine accounts for its frequent repetitive dosing among users.

Therapeutic Uses. Cocaine, usually in combination with epinephrine, is widely used as a topical anesthetic for nasal surgical procedures.

Effects on Athletic Performance. Despite the amphetamine-like properties of cocaine, no evidence suggests that cocaine enhances athletic performance in a sustained fashion given its short duration of action. Performance deteriorated by fatigue could be briefly restored to normal but frequent use would be necessary to sustain it.[52] Athletes' use of cocaine--an illicit drug of abuse--is primarily for purposes other then performance enhancement

Potential Adverse Effects. The acute effects of cocaine use may include insomnia, euphoria and depression, confusion, delirium, paranoia, hallucinations, psychosis, repetitive behavior and anorexia and addiction.[53] Convulsions, seizures and other neurologic complications may occur[54] and the risk of sudden death as a result of a heart attack or irregular heartbeat is increased.

Testing. Urine, blood and hair tests may be used to detect cocaine. The period of detection in urine is up to five days following last use, depending on dose and duration of ingestion.[55]

Caffeine

Caffeine is one of the most widely used drugs in the United States and around the world. Its use dates back to Paleolithic times. It is commonly found in coffee, tea, chocolate products, diet pills and in a wide array of over the counter drugs including Excedrin, Dexatrim and No Doz.

Biochemical/Physiological Effects. Caffeine is a central nervous system stimulant. The main psychic effects following caffeine ingestion include increased alertness, clearer thinking, shortened reaction time and increased capacity

for attention-requiring tasks.[56] Caffeine is readily absorbed following ingestion. Caffeine's effects can be perceived as performance-enhancing when taken in excess.

Therapeutic Uses. Caffeine is used therapeutically for headaches when taken in moderation.

Effects on Athletic Performance. Believing that it will enhance performance, athletes have long consumed caffeine both alone and in combination with the sympathomimetic amines. Whether caffeine has a significant enhancing effect on high-intensity, short-term exercise is questionable.[57] There is better evidence for its enhancing effect on endurance performance through its wide-ranging physiological and psychological effects.[58]

Regarding caffeine's effect on other measures of performance that are important in athletic competition, the data tend to be poorly substantiated and/or contradictory. For example, some studies indicated that ingesting caffeine does not produce less drowsiness, increased vigilance, reduced fatigue and/or an increased capacity for sustained intellectual work. Other studies show that performance on mental tasks which require prolonged concentration is significantly improved after caffeine ingestion. Still other reports state that coordination and other fine motor skills are neither clearly enhanced nor diminished following caffeine ingestion.[59]

Potential Adverse Effects. The effects of chronic caffeine intake include nervousness, irritability and insomnia and may occur in different individuals at varying doses. Effects of acute use include: rapid heartbeat, gastrointestinal distress, peptic ulcer, severe hypertension, delirium, seizures, coma, arrhythmia and even death.[60] At the threshold at which performance is enhanced (about 400 mg), few adverse health effects would be noted. Extremely high doses of caffeine are not needed to improve performance since there does not seem to be a dose-response relationship between caffeine (beyond a threshold) and endurance performance.[61]

Testing. Caffeine is detectable readily in urine. To test positive for caffeine use requires ingesting the equivalent of six to eight cups of coffee in one sitting and testing within two to three hours.[62]

Beta-2 Agonists

Biochemical/Physiological Effects. Beta-2 agonists are unusual because they are classified by the IOC as both stimulants and as anabolic agents. Several animal studies have found that beta-2 agonists significantly reduce the amount of body fat by up to 20 percent.[63] They have a fat reducing effect in humans too, but most likely not to the same extent as in animals because there is no evidence humans can tolerate the comparative doses that were given in the animal studies. There are large variations in the duration of action of the beta-2 agonists, depending upon the specific drug, its dose, and/or the route of administration.

Therapeutic Uses. Beta-2 agonists such as salbutamol, salmeterol and terbutaline are permitted "in the aerosol or inhalant forms only to prevent and/or treat asthma and exercise-induced asthma."[64] These drugs are nearly 95 percent effective in protecting against exercise-induced asthma and have long been first-line therapy for this purpose.[65]

Effects on Athletic Performance. There is no research documenting that the inhaled beta-2 agonists enhance athletic performance in individuals who do not suffer from exercise-induced asthma.[66] However, there is little question that they do enhance performance in individuals with such disorders. When beta-2 agonists are taken either orally or by injection, there have been documented performance-enhancing effects.[67] Examples of beta-2 agonists that are prohibited even in the inhaled form include clenbuterol and reproterol.[68] One form of beta-2 agonist, clenbuterol, was the drug that tainted the 1992 Barcelona Olympics.

Potential Adverse Effects. Leading side effects include rapid and irregular heartbeat and muscle tremors.[69]

Testing. There is no simple test for beta-2-agonists. Screening for beta-2-agonists is performed by gas chromatography, with confirmation analysis performed by GC/MS. Screening analysis for clenbuterol is commonly accomplished by inclusion in the anabolic steroid GC/MS screening procedure. The period of detection of beta-2-agonists in urine is up to five days after last use.[70] A positive test result for beta-2 agonists does not distinguish whether the intent of use was for therapeutic or performance-enhancing reasons. Thus, testing for beta-2 agonists poses a more serious problem for officials in terms of determining intent, positive test result management and sanctions. The cost of testing ranges from $300 to $500, similar to tests for amphetamines.[71]

Beta-Blockers

Biochemical/Physiological Effects. Beta-blockers refers to a class of drugs that block the action of adrenaline (by blocking the beta-adrenergic receptors) and thereby relieve stress to the heart muscle.[72]

Therapeutic Uses. Beta-blockers are often used to slow the heart rate or lower the blood pressure. They commonly are used in the treatment of hypertension, angina and certain heart beat irregularities, and they serve as primary treatment for migraine relief and for control of tremors.[73]

Effects on Athletic Performance. Beta-blockers are used by athletes who compete in events that require hand and arm steadiness, such as archery, pistol shooting and riflery due to their anti-tremor and anti-anxiety effects.[74]

Potential Adverse Effects. Reduced functioning of the heart and congestive heart failure may develop in individuals with pre-existing heart problems. These drugs may induce bronchospasms in asthmatics, or may cause insomnia, nightmares and depression. Sexual dysfunction may develop in males who use beta-blockers.[75]

Testing. Beta-blockers are time-of-competition drugs. The level of drug in the urine is determined using GC/MS.[76]

Human Growth Hormones (hGH)

Biochemical/Physiological Effects. Growth hormone is a peptide hormone secreted by the pituitary gland. A major function of hGH is the maintenance of normal rates of growth from birth until the attainment of adult height. Its most apparent effects occur during adolescence. The release of hGH is controlled by many factors including diet, exercise, nutrition, drugs and various biological feedback mechanisms. High-intensity exercise is associated with an elevation in growth hormone levels.[77]

Therapeutic Uses. In the United States, two genetically engineered human growth hormone products have been approved by the FDA; somatropin and somatrem. These drugs are restricted to people with documented growth hormone deficiency (short stature, Turner's syndrome and delayed puberty). hGH has been shown to be effective in increasing weight, increasing lean body mass and improving muscle power in HIV-positive patients with AIDS or AIDS-complex.[78]

Effects on Athletic Performance. Growth hormone appeals to athletes who are trying increase their lean body mass and shorten recovery time.[79] The fat-burning properties of hGH are documented[80] and studies have also shown increases in fat-free weight.[81] In one study, however, hGH had no effect on highly trained power athletes with little fat mass and high lean body mass suggesting that a ceiling may exist for the desirable effects of hGH.[82] Athletes may use hGH believing that it shortens recovery time although this finding is unsubstantiated. To date, there are no well-controlled studies of hGH demonstrating actual improvements in strength or endurance as a consequence of its use in nongrowth hormone deficient individuals. Although there may be an increase in muscle size, there is no evidence of any increase in muscle strength. Anecdotal evidence suggests that many athletes think that hGH use will give them the same sought-after

effects of steroids without the risk of the drug being detected or of the same adverse effects associated with steroid use.[83]

Some parents and adolescents believe that they can increase artificially an adolescent's height by taking growth hormone, although there is no objective evidence to substantiate the belief. Because it does not produce the same masculizing effects of anabolic steroids, hGH has potentially more appeal to females than steroids.

Potential Adverse Effects. Side effects that have been reported include headache, enlargement of the adenoids with snoring and further growth of the hands, feet and face. Enlargement of the internal organs--heart, liver, spleen and kidneys--may occur.[84] Other effects include disorders of the peripheral nerves, diabetes, hypertension, premature cardiovascular disease, impotence, osteoporosis and colonic polyps.[85] As with all abused injectable drugs, there is a risk of acquiring HIV, hepatitis and bacterial infections if contaminated needles are shared.

Testing. Currently, there is no reliable and valid test to detect the abuse of hGH. As with anabolic steroids, it is used as a training drug and will require that testing be done on a year-round, out-of-competition, unannounced basis.

Insulin-like Growth Factor (IGF-1)

Biochemical/Physiologic Effects. IGF-1 is a peptide hormone that is indirectly responsible for the growth-promoting effects of hGH.[86] It stimulates protein synthesis.[87] Independent of hGH, IGF-1 reduces protein break down and increases the number of cells.[88]

Therapeutic Uses. There are two approved uses for IGF-1--Larontype dwarfism and type A insulin resistance syndrome. In the former, hGH receptors do not respond to hGH but do respond to IGF. IGF-1 is currently under investigation for use against such diseases as advanced AIDS, osteoporosis and advanced kidney disease.

Effects on Athletic Performance. There are no studies demonstrating any performance enhancement capabilities attributable to IGF-1, be it gains in strength, aerobic capacity or lean body mass. As with growth hormone, there are no masculizing effects (as seen in the abuse of steroids) in females. IGF-1 is banned on the presumption that the drug's ability to increase muscle mass allows the potential for unfair ergogenic gains.

IGF-1 appeals to many of the same individuals who use hGH. Like hGH, IGF-1 is injected intramuscularly. However, in view of its newness to the marketplace, very little is known about its abuse patterns.[89]

Potential Adverse Effects. Side effects of IGF-1 use are similar to those of hGH. Drops in blood sugar (hypoglycemia) are common.[90] As with all abused injectable drugs, there is a risk of acquiring HIV, hepatitis and bacterial infections if contaminated needles are shared. Recently, gene transfer techniques have made it possible to target the injection of IGF-1 directly into a muscle, limiting its effects to the injected muscle and averting systemic side effects.[91]

Testing. IGF-1 and the other peptide hormones (EPO and hGH,) are potentially attractive to athletes because they cannot be detected through routine urine drug screening. Studies of ways to detect IGF-1 in blood are underway but, as of yet, there are no reliable and valid tests. Gene transfer using IGF-1 also may preclude any reasonable hope of detecting ergogenic use of IGF-1 by athletes in the future.

Erythropoietin (EPO)

Biochemical/Physiological Effects. The rate of production of red blood cells is, in part, governed by EPO. EPO stimulates bone marrow stem cells to produce red blood cells, which in turn transport oxygen from the lungs to all organs of the body, including the muscles.

The duration of the peak benefits of EPO is a function of the route of administration: between four and five hours when administered intravenously and between five and 24 hours

when administered subcutaneously.[92] Despite its primarily short term effects, red cell production is stimulated for as long as three weeks.[93]

Therapeutic Uses. The gene that codes for EPO was cloned in 1985. As a result, EPO became clinically available in Europe in 1987 and in the United States in 1989. Although its initial clinical use was limited to anemia associated with chronic kidney disease, its clinical applications have been expanded and now include use for treatment of anemia associated with AIDS and chemotherapy.

Effect on Athletic Performance. EPO found its way into sports as an alternative to blood doping, the practice of intravenously infusing blood into an individual in order to induce an elevated red blood cell count. Blood doping has been used by athletes in aerobic sports to increase their total aerobic power by increasing the transport of oxygen to their working muscles. It is a dangerous practice that has long tainted sports. Blood doping and EPO administration both result in enhanced aerobic power.

Potential Adverse Effects. The abuse of EPO raises both the red blood count and the thickness of the blood, which can simulate the effects of certain blood diseases and raise the possibility of clot formation, stroke and heart attack.[94] With dehydration that normally accompanies endurance sports, there is a further increase in blood viscosity and a substantially increased risk of heart attack or stroke. As with all abused injectable drugs, there is a risk of acquiring HIV, hepatitis and bacterial infections if contaminated needles are shared.

Testing. The International Cycling Union and International Ski Federation use a hematocrit level (red blood cell count) of greater than 50 as an indicator of EPO abuse. This is somewhat problematic in that there are individuals who normally have hematocrits of greater than 50 for a variety of reasons. Genetics plays a role in determining normal hematocrit levels. Training at high altitudes or by using a hypobaric oxygen chamber can increase EPO and hematocrit levels as well, without the use of any pharmacological intervention.[95]

The International Olympic Committee's medical commission approved the use of two tests for EPO on August 1, 2000 for the upcoming Summer games.[96] On August 28, 2000, the IOC executive board announced that it had approved plans to carry out EPO testing. Between 300 and 400 out-of-competition tests for EPO will be conducted randomly in Sydney.[97]

Although previous urine tests could not detect the difference between natural and artificial EPO, the new French test (urine test) can make this distinction. It detects direct use of EPO but only for a period of three days.[98] The new Australian test detects changes in the blood caused by use of EPO. Although this is an indirect test, it can detect use for two to three weeks.[99] Current requirements for the 2000 Olympics are that both the urine and blood tests be positive for EPO to avoid false positives. While this will minimize the possibility of false positives, it does leave a window open for athletes to use EPO and avoid sanctions due to the short detection time of the urine test.

EPO is essentially a training drug and its effects long outlast its detectability. Testing for EPO would have to be done year-round, unannounced and randomly. For these reasons, the costs and logistics associated with such testing may be quite high. In addition, testing for EPO would involve the much more intrusive method of getting a blood sample. The blood test for EPO costs between $600 and $800 while the urine test for EPO costs $2000.[100]

Narcotics

Biochemical/Physiological Effects. This class of drugs includes opium and its natural and synthetic derivatives including heroin, morphine and codeine. These drugs have primary effects on the central nervous system and the gastrointestinal tract. The effects of narcotics are pain relief, feelings of either elation or sedation, drowsiness, mental clouding and decreased bowel activity. In higher doses, muscular rigidity, respiratory depression and

low blood pressure may occur. Tolerance to the drug develops fairly quickly when using opiates, resulting in the use of higher and higher doses to obtain the same effects.[101] Withdrawal from the drug once physiological dependence has occurred results in symptoms including nausea, vomiting, abdominal cramps and muscle aches.[102] Oral narcotic use has a peak effect time from one to two hours and a duration of three to six hours.[103]

Therapeutic Uses. Narcotics are used primarily to manage moderate to severe pain. They are also among the best drugs to suppress coughs and diarrhea. Methadone is used to wean people off heroin or maintain them in some cases.

Effects on Athletic Performance. Narcotics are frequently used by athletes who are injured or in pain in order to compete at optimal performance levels. This blocking of pain, which allows the athlete to keep performing, can lead to severe, even career-ending results. Narcotics were added to the IOC list of banned substances for their potential for increasing the possibility of serious injury to an athlete linked to playing through pain.

Potential Adverse Effects. Adverse effects of narcotics include: nausea, vomiting, dizziness, mental clouding, sedation, constipation, delirium and addiction.[104]

Testing. Urine, blood, and hair testing may be used to detect the presence of narcotics. Tests for narcotics may include morphine, codeine and over 20 different synthetic products. Morphine detected in urine may be from use of morphine or may be present as a metabolite of heroin use. Urine samples containing morphine and codeine, with the morphine in greater concentration than codeine, are most likely positive due to the consumption of poppy seed food products. Urine samples containing morphine and codeine, with the codeine in greater concentration than morphine, are most likely positive due to the use of pharmaceutical codeine. Opiates can be detected in urine for up to five days following last use.[105]

Nonperformance-Enhancing Drugs

Alcohol

Despite the tremendous economic and social costs associated with its abuse, alcohol has the unique distinction of being the only potent drug in which self-induced intoxication is widely accepted. It is the most abused nonperformance-enhancing drug in sports.[106]

Biochemical/Physiological Effects. Alcohol (ethanol) is a general central nervous system depressant. Once ingested, it is absorbed rapidly into the blood stream and distributed throughout the body. Alcohol's effects can range from euphoria and giddiness to coma and even death, depending on blood alcohol concentration.[107] Blood alcohol levels are influenced heavily by body weight and/or the presence of food.

Certain parts of the brain are particularly susceptible to alcohol's effects, resulting in loss of coordination and lessened awareness of pain. Central nervous system effects are generally proportional to the concentration of alcohol in the blood.[108] Euphoria, impaired mental status and a slight loss of coordination occur at lower levels of alcohol in the blood. Higher levels result in nausea, vomiting and marked clumsiness. Cold sweat, anesthesia and coma can occur at still higher levels.[109] Variables such as genetics, nutrition and general state of health, influence alcohol-related adverse effects.[110]

Therapeutic Uses. Ethanol has very limited clinical use. It is used as a solvent for the delivery of many drugs and dehydrated alcohol can be useful as a nerve block for pain relief in certain disorders.

Effects on Athletic Performance. Alcohol is usually not viewed as a performance-enhancing drug, although some studies indicate that low-dose alcohol may reduce anxiety that could hypothetically improve athletic performance in certain sports (e.g., riflery).[111] Studies consistently show significant deterioration in several aspects of psychomotor skills and performance decreases as blood alcohol levels

increase.[112] Balance and steadiness, reaction time, fine and complex motor coordination, visual tracking and information processing are all impaired as blood alcohol levels increase.[113] Alcohol has been shown to increase running times in sprinting and middle distance events.[114] Decreases in anaerobic strength tasks (muscular output as in the vertical jump) also may occur following alcohol administration.[115] Endurance (as measured by aerobic capacity), maximum oxygen uptake and oxygen consumption all appear to be unaffected by alcohol at small or moderate quantities.[116]

Athletes who consume alcohol to the point of legal intoxication (blood alcohol content of 0.1) the evening before practice or competition may subsequently perform significantly worse in tasks requiring attention and visual-motor coordination skills for as long as 14 hours.[117]

Potential Adverse Effects. Chronic alcohol consumption may eventually cause tolerance, addiction and numerous adverse health effects. Because of the dehydration effects of alcohol, the use during an athletic event can result in heat intolerance.[118] Individuals dependent on alcohol may experience alcohol withdrawal syndrome, including tremors and hallucinations. Excessive alcohol consumption can cause damage to the brain, heart, skin and blood, can damage the endocrine system, disrupt metabolism and cause psychiatric and sexual maladies.[119]

Testing. Breath, urine and blood tests may be used to detect alcohol. The period of detection of ethyl alcohol in blood, breath or urine is only a matter of hours after consumption--much shorter than testing for other abused drugs or chemicals. Use of over-the-counter cold medications containing ethyl alcohol, which may contain up to 30 percent alcohol, result in detectable amounts of alcohol in the urine.[120]

Marijuana

Biochemical/Physiological Effects. Marijuana is derived from the leaves and stems of the plant *Cannabis sativa*. It contains over 400 chemical entities, of which 60 are biologically active.[121] The main active ingredient is delta-9-tetrahydrocannabinol (delta-9-THC). Numerous biochemical effects influence behavior. In recent years, the potency of some marijuana has increased five to 10 times or more.[122] An understanding of the pharmacology of illicit marijuana is complicated by the variations in dosages used, as well as by the presence of numerous adulterants, including phencyclidine (PCP). Extraction processes produce more potent forms of marijuana, such as hashish and hashish oil.

While marijuana can be smoked or taken orally, the efficiency of the delivery of delta-9-THC is about 14 percent greater if smoked.[123] The strongest effects occur within 20 to 30 minutes of smoking marijuana, although effects persist for between two to four hours.[124] If taken orally, the peak effects occur between 30 minutes and two hours of ingestion, while effects last from three to five hours.[125]

Therapeutic Uses. Marijuana is not recognized or approved for medical use in the United States by federal law, although it is legal for medical purposes by state law in some states (Arizona, California, and Washington).[126] Smoking as a pharmaceutical route of administration is not practiced for any current medication in the US. Cannabinoids, chemicals unique to the *Cannabis sativa* plant, have been isolated and purified and studied for therapeutic use. THC has been approved as a therapeutic agent to control nausea associated with cancer or AIDS therapy. For almost all therapeutic applications studied there are currently adequate alternative pharmaceutical products available.

Effects on Athletic Performance. No performance-enhancing effect has been attributed to marijuana use, although it does promote weight gain and relaxation which could theoretically improve performance in some sports.[127] Many of the acute effects of marijuana are harmful to athletic performance, such as impaired eye-hand coordination and reaction times, and reduced motor coordination, tracking ability and perpetual accuracy.[128] As with alcohol, marijuana use the night before a practice or game may impair performance. The immediate effects of marijuana may last as long

as four hours while skill impairment may persist for as long as 24 hours after marijuana intoxication.[129] Marijuana decreases endurance and reduces exercise performance.[130]

Potential Adverse Effects. Side effects for marijuana use include paranoia, panic attacks, delirium, psychoses, decreased attention span and concentration ability, decreased memory, euphoria, excitement, calmness, dissociation of ideas, relaxation, anxiety, distortion of time and visual perception, and a decrease in psychomotor performance (nonreflexive movement).[131] Chronic marijuana use is associated with apathy, impaired judgment, loss of ambition and an inability to carry out long-term plans.[132] Both psychological and physical dependence can occur.[133] Chronic inhalation of marijuana may cause damage to the sinuses, voice box and lungs.[134]

Testing. Urine and blood tests may be used to detect marijuana. At the IOC screening level, an occasional or chronic marijuana user may be detected for up to three days following last use.[135] Detection is complicated by the many commercial products sold over the internet or at nutritional/sports supplement stores to "beat the test." Some adulterant products (Whizzies, Klear) may chemically "destroy" the evidence in the urine. Another product, Stealth, is reported to both destroy evidence of the drug and all traces of itself.[136]

Dietary Supplements

Nutritional supplements have become popular components of athletes' strategies to maximize the results of exercise and weight training. The passage of the Dietary Supplement Health and Education Act (DSHEA) of 1994 was followed by an enormous increase in the sale of dietary supplements in the United States and around the world. Under the Act, a dietary supplement is defined as: "…a product (other than tobacco) that is intended to supplement the diet that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, an herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total daily intake, or a concentrate, metabolite, constituent, extract, or combinations of these ingredients."[137] The law prohibits express or implicit claims that a dietary supplement has an effect on identifiable diseases or class of diseases. The law permits the manufacturer to use structure or function claims (e.g., increased strength and muscle mass) for its products without prior FDA approval.[*] [138]

There are countless dietary supplements currently available. To name but a few, they include ephedrine, glutamine, branched-chain amino acids, creatine, leucine, beta-hydroxy-beta-methylbutyrate (HMB), chromium, L-carnitine, choline, vanadyl sulfate, boron, dehydroepiandrosterone [DHEA] and androstenedione. Ephedrine (e.g., Ma Huang) is used to lose weight and is one of the most commonly abused dietary supplements.[139] DHEA was found to be less effective at increasing muscle mass and is being marketed now towards an older population with promises of looking and feeling younger. There are hundreds of other dietary supplements on the market, even though there is insufficient evidence on efficacy or adverse effects for many of them.

At the point of sale, supplements like androstenedione and DHEA that are precursors to testosterone, are not controlled substances (as defined by the Controlled Substances Act),[140] but are converted into testosterone (which is a controlled substance) by the human body where they exert their hormonal effects. Thus, some of these substances pose a unique problem to sports.

Complicating the testing process is the incomplete labeling of nutritional products. Athletes have posed several challenges to doping accusations on the grounds that inadequate and inaccurate labeling of nutritional

[*] Drugs, as distinguished from dietary supplements, are regulated by the Food and Drug Administration (FDA). The FDA determines whether drugs are offered over the counter or by prescription. Drug manufacturers are responsible for assuring safety and purity of the products.

supplements resulted in their unintentional ingestion of a banned substance. Because nutritional supplements are unregulated and their labeling not closely monitored, athletes have no way of truly knowing what is in a nutritional supplement prior to taking it. Consequently, upon a positive test result, two possibilities present themselves. Either the athlete is an innocent victim of circumstance (i.e., the athlete used what he or she perceived to be a legal nutritional supplement based on the product label) or a doping infraction has occurred wherein the athlete is using the uncertainty of the supplement's labeling as a convenient excuse.

Creatine

Biochemical/Physiological Effects. Creatine phosphate plays a vital role in regenerating ATP (an energy storing molecule found in all cells) in skeletal muscle providing energy for muscle contraction.[141] Creatine supplementation can increase muscle phosphocreatine content (but not in all individuals).[142] Traces of creatine are normally present in the urine. An increase in muscle creatine content can delay the onset of fatigue during high-intensity, short duration muscle work.[143] Thus, oral creatine supplementation has become popular among athletes and bodybuilders to enhance their short-term physical performance.

Therapeutic Uses. Creatine has been shown to increase strength in patients with neuromuscular diseases.[144] Creatine is used to treat patients with gyrate atrophy, a progressive disease affecting the eye.[145]

Effects on Athletic Performance. Unlike most dietary supplements, there is a body of research demonstrating performance enhancement from creatine supplementation in exercise (repetitive, high-intensity, very short duration exercises associated with short recovery times).[146] However, the response is not universal.[147] Some benefit; some do not. In the short term, most reports of creatine supplementation have demonstrated an increase in fat free mass,[148] although much of this weight gain may be related to water retention rather than an increase in lean body mass.[149] Creatine plus weight training leads to greater increases in strength than weight training alone.[150]

Although the IOC does not ban creatine, its use contravenes the initial intent and definition of doping which called for the banning "of any physiologic substances taken in abnormal quantity for the purpose of enhancing athletic performance."[151]

Potential Adverse Effects. Despite the incredibly fast growth in the use of creatine in recent years, reports of side effects have been relatively few[152] and, anecdotally appear to be related primarily to water retention and muscle cramps. Since there are currently no long-term prospective studies addressing the adverse effects of creatine supplementation, the negative long-term effects are unknown. There is some evidence to suggest that ingesting creatine supplements tends to decrease the body's own natural production of creatine in a variety of organs including the brain and testes.[153] However, once supplementation is stopped, endogenous creatine levels appear to return to normal.[154]

Testing. Creatine readily appears in the urine as creatinine.[155] Since one can, however, consume large amounts of creatine in diets rich in meat and fowl, to date there is no practical way to establish acceptable cut-off levels for the purpose of sanctions.

Androstenedione

Biochemical/Physiological Effects. Androstenedione is a naturally occurring hormone produced by the adrenal cortex, ovary and testes.[156] It is converted in the liver to testosterone.[157] Androstenedione is considered a dietary supplement under DSHEA,[158] not as a drug, even though it is classified pharmacologically as an androgenic (producing masculine characteristics) steroid.[159] Consequently, it can be bought without a prescription.

Therapeutic Uses. There are no known therapeutic uses of androstenedione.

Effects on Athletic Performance. Although use by Major League Baseball player Mark McGwire brought androstenedione to public attention, it was developed by the East Germans in the early 1970s and administered intranasally, typically before an event, in an attempt to enhance the performance of their Olympic athletes.[160] The attractiveness of androstenedione lay in the fact that it purportedly could provide the athlete with the advantages of anabolic steroids both legally and relatively inexpensively. Despite being legal for over-the-counter purchase, androstenedione is banned by some sports organizations,[161] although no studies to date have documented performance-enhancing effects. A 1999 study found that oral androstenedione supplementation (300 mg per day) does not increase testosterone concentrations nor does it provide any advantages during strength training.[162] However, a more recent study suggests that oral androstenedione (when given in dosages of 300 mg per day) increases serum testosterone and estradiol concentrations in some healthy men.[163] This may result in the same competitive advantage as taking testosterone.

Potential Adverse Effects. Androstenedione is metabolized to testosterone and to estrogens, including estradiol, a female hormone with known side effects (e.g., breast enlargement in males).[164] Although not adequately studied, the abuse of androstenedione and related substances may result in similar adverse effects associated with the abuse of anabolic steroids.[165] As with anabolic steroids, these adverse effects may include testicular atrophy, and masculinization in females.[166] In a 1996 study, androstenedione was associated with a decrease in HDL, also known as "good cholesterol."[167] Exposure to elevated levels of estradiol in women may increase their risk for breast cancer.[168] Since DSHEA does not require the manufacturer to prove purity, samplings of marketplace supplements have revealed commercial products with varying levels of androstenedione--from very high to none at all, while some actually contain the male hormone testosterone.[169]

Testing. Androstenedione is detectable in urine. Because androstenedione is converted to testosterone, its use has been demonstrated to produce T/E ratios in excess of 6:1.[170]

19-norandrostenedione

Biochemical/Physiological Effects. 19-norandrostenedione is a substance that is converted in the body to a steroid. Ingesting it leads to conversion in the liver to 19-nortestosterone, also known as nandrolone.[171] Very small amounts of nandrolone are normally present in the body and detectable in the urine. In 1999, 343 positive urine samples for nandrolone were reported in international sports. Nandrolone is the active ingredient in the injectable anabolic steroid that was so widely abused in the 1980s, Deca-Durabolin.

Therapeutic Uses. There are no known therapeutic uses of 19-norandrostenedione.

Effects on Athletic Performance. Once metabolized, it has effects on athletic performance similar to androstenedione.[172] 19-norandrostenedione is banned by the same sports organizations banning androstenedione.

Potential Adverse Effects. Side effects of 19-norandrostenedione appear to be similar to androstenedione and may include testicular atrophy in males and masculinization in women.[173]

Testing. Urine testing is used to detect the use of 19-norandrostenedione. Recently, the tolerance levels for the test were disputed by Federation Internationale de Football Association (FIFA) claiming that stress can result in higher levels. There have been many high profile cases of positive nandrolone tests recently; many of the athletes who tested positive have claimed that it was due to the unwitting ingestion of meat containing nandrolone or of 19-norandrostenedione in dietary supplements.[174] A metabolite of 19-norandrostenedione is found in the urine of females using birth control medications containing the steroid norethisterone.[175]

Use of the injectable oil-based nandrolone (Deca-Durabolin) may be detected in the urine

up to nine months following last use. Nandrolone from contaminated meat or oral dietary supplements are detected in the urine for no longer than five days following ingestion.[176] Current testing technology cannot differentiate between natural, pharmaceutical, diet, or supplement forms of nandrolone.

Beta-Hydroxy Beta-Methylbutyrate (HMB)

Biochemical/Physiological Effects. Marketed as a "Protein Breakdown Suppressor," HMB (beta-hydroxy beta-methylbutyrate) purportedly inhibits the breakdown of muscle proteins during strenuous exercise and results in larger gains in muscle function associated with resistance training.[177] However a more recent study of experienced resistance-trained males found that HMB supplementation during resistance-training does not have any effect on body composition or strength.[178] Further research needs to be done.

Therapeutic Uses. There are no known therapeutic uses of HMB. However, a recent study found that HMB supplementation appears safe in humans at three grams per day, and that it may decrease cardiovascular risk factors such as total cholesterol, LDL cholesterol and systolic blood pressure.[179] Caution should be taken when interpreting these results until further studies replicate the findings.

Effects on Athletic Performance. HMB is attractive to athletes and body builders because of manufacturers' claims that it increases lean body mass and strength coincident with strenuous exercise and is not banned by sports organizations. One study found that subjects given HMB in addition to resistance training increased the amount of weight they could lift while a second group of subjects increased their fat-free mass.[180]

Potential Adverse Effects. Not much is known about HMB's potential side effects. Before any study was ever published in any peer-reviewed literature, it was brought to market based on an abstract of a single study involving 28 human test subjects receiving HMB over a three week period encompassing two different dosages.[181] At the time HMB came to market, the only claims to product safety were animal studies and the fact that no adverse effects were noted in the 28 human subjects.[182]

Testing. Not tested for currently.

Masking Agents and Methods of Beating Drug Testing

Athletes can employ a variety of methods to beat tests. In general, however, this type of in-competition cheating, with observed collection, is very difficult.

The most commonly used masking agents are diuretics for their ability to dilute the presence of other banned substances in urine, and Probenecid because it blocks the excretion of some steroids preventing detection in drug tests.[183] Other methods designed to beat testing such as adding adulterants to the sample and catheterization also are illegal.

Diuretics

Biochemical/Physiological Effects. Diuretics are drugs that increase the rate of urine formation and accelerate water loss from the body. They dilute the urine in the body and thus reduce the concentration of drugs present in the urine sample so that they will be missed in the drug test.

Therapeutic Uses. Diuretic drugs often are prescribed to treat congestive heart failure, high blood pressure, and edema (an abnormal accumulation of the fluid that fills the spaces between the cells of body tissues).[184]

Effects on Athletic Performance. In addition to use to dilute and thus confound a drug test, athletes use diuretics to achieve rapid weight loss in sports where weight categories are involved. Although these are the primary uses of diuretics, there is a study that documented that athletes given diuretics significantly improved their vertical jumping ability.[185] Males who participate in weight-category sport such as wrestling, boxing, martial arts, and

horse-racing may use diuretics to deliberately drop up to three to six percent[186] of body weight prior to competition in order to qualify in the lowest weight category possible. This result is often achieved by combining diuretics with some combination of exercise, food and water restriction, heat exposure (e.g., sauna), self-induced vomiting and laxatives. Body builders use diuretics to obtain a "cut" or fit appearance.

Similar methods are used by female athletes in sports such as gymnastics, figure skating and dancing. Females also may use diuretics to manage premenstrual fluid retention. For female athletes, diuretics may be used in conjunction with excessively strict dieting for weight loss, a practice common among those suffering from anorexia nervosa (the obsessive need to become thinner).

Potential Adverse Effects. Most diuretics have the effect of causing excessive and potentially life threatening changes in potassium levels in the body. Additional adverse effects include dehydration, muscle cramps and decreased blood volume frequently associated with a drop in standing blood pressure.[187]

Testing. Urine testing is typically used to detect diuretics both in-competition and out-of-competition no-notice, testing. Diuretics are tested for in weight specific sports events or if a very dilute urine sample is produced The period of detection of diuretics in urine by is up to five days after last use.[188]

Adulterants

Commercially available agents can be added to a urine sample to interfere with testing of drugs of abuse. Adulteration is possible when there isn't a supervised collection process that can guarantee the purity of the sample. There are reports that the ingestion of particular compounds may cause false-negative results for drug screens in urine; however, most ingested products are generally not effective in beating drug tests. The use of adulterants underscores the need for guarantees of the integrity of the sample.

Catheterization

Catheterization is used to empty the bladder so that it can be refilled with a clean urine sample. This is a drastic measure that is both painful and requires advance notice of a drug test. Catheterization must be done very close to the time the sample is taken since the athlete's own urine will be produced and the clean urine will become contaminated.

Another way urine is substituted is by inserting a bulb filled with clean urine into the vagina which would burst when muscles are contracted. This method of beating the tests would not be very likely during a competition because the bulb would probably not be able to withstand strenuous activity.[189]

The Future for Drug Testing

New drugs are constantly being developed to give the user a competitive edge yet still elude detection or avoid sanction. Sports governing bodies have been two steps behind, scrambling to develop tests once widespread use has already been noted.

A more potent deterrent than current testing practices would be to use drug testing methods that have longer detection windows or media that contain a higher concentration of drugs. For example, blood tests, although more invasive, have higher concentrations of drugs compared to urine making it harder to mask drug use.[190] Another option, supported by former gold medalist and current Chief of the US Anti-doping agency, Frank Shorter, is to freeze urine samples and subject them to each new detection test that is developed.[191] The threat of having a medal stripped away at some future date and one's reputation tarnished may provide a deterrent to doping. Whether this is feasible, due to chain of custody concerns and degradation of samples over time, is unknown.

Other forms of testing require more research. Hair testing still remains controversial. Some studies have documented that hair testing provides a much larger window of detection than

urine, blood or saliva testing[192] and is especially powerful for detecting amphetamines.[193] However, other research shows that different hair pigmentation produces different results: darker, coarser hair tends to show drug use for longer and at lower concentrations.[194]

Another area of research underway is a test to identify performance-enhancing properties of a substance rather than to simply test for the presence of a substance.[195] Such a test would eliminate the problem of chemists minutely changing the structure of a drug (i.e., androstenedione, 19-norandrostenedione, 19-nor androstenediol, etc.) to retain the same effect but avoid sanction.

Chapter IV
How Big is the Doping Problem in Olympic Sports?

Estimates of prevalence of doping among Olympic athletes vary widely. The International Olympic Committee (IOC) and several National Federations administering drug testing programs indicate that less than three percent of athletes test positive for any banned substances.[1] Other credible sources indicate use to be very much higher, including one report where Olympic officials estimate the actual number at 10 percent.[2] Some veteran athletes put the figure at closer to 30 percent.[3] At this rate, over 3,000 athletes would engage in doping for the 2000 Sydney Games. In cycling, prevalence estimates have been documented to reach as high as 45 percent.[* 4] Some athletes, coaches and trainers believe that drug use in sports is much higher than any of these statistics suggest - up to 80 or 90 percent in some sports.[5] While each of these data sources has particular strengths and limitations, together they present a disturbing picture of doping in Olympic level competition. Moreover, some experts believe doping among elite athletes will only get worse as technological advances continue to be made at breakneck pace.

> *You can produce statistics showing that we have tested 35,000 persons in one year, as the IOC did in 1987, and only some eight or ten were caught. But that is, of course, because everybody knows the game.*[6]
>
> --Hans Skaset, President
> Norwegian Confederacy of Sport

[*] The International Federation for cycling, Union Cycliste Internationale (UCI), has stated that all riders who tested positive for a banned substance during the cited competition proved the drugs were being taken under medical supervision and within UCI rules.

Drug Testing Results Under-Report Use

Drug-testing statistics present a relatively benign picture of the size and magnitude of the doping problems in sport. Experts examining the use of prohibited substances by Olympic level athletes believe that most prevalence estimates under-report actual use. While documented and reported positive test results are an obvious and readily accessible means for making prevalence estimates of substance use among Olympic athletes, these data are limited in three very important ways.

First, drug-using athletes are often very knowledgeable about how to circumvent the tests. In the case of in-competition testing, athletes can determine when to discontinue use of a drug prior to testing so as to allow the metabolites of the drug to clear the body and avoid a positive test result.[7] In out-of-competition testing, for example, an athlete can self-monitor his or her testosterone/ epitestosterone ratio and manipulate drug intake to ensure a test result below the maximum allowable ratio of 6:1. In such cases, the maximum allowable threshold transforms from an absolute limit intended to allow for normal variation between individuals into a target to be approached as closely as possible.

> *Random testing is a joke.*
>
> --Head Coach of elite level competitors

Second, testing technologies are not yet capable of positively identifying all forms of substance use. For example, despite their purported high level of use, there is currently no accepted, reliable and valid urine test for detecting doping with human growth hormone (hGH) or insulin-like growth factor (IGF-1). The ability of athletes to circumvent tests and the lack of reliable and valid testing methods for several substances lead most experts to conclude that only the stupid actually get caught and that drug-testing statistics yield a large number of false-negative results.

Third, the bodies conducting athlete drug testing must be unequivocally motivated to detect and report performance-enhancing drug users. One of the primary objectives of the IOC, international sports federations and National Governing Bodies is the promotion of sport. This goal is not always compatible with the goal of detecting and disclosing performance-enhancing drug use in star athletes. To the degree that sports governing bodies are limited in their ability to separate their dual functions as the primary promoters of sport and police of drug use among their athletes, testing statistics may under-report actual use. Drug-testing statistics probably should best be viewed as an absolute minimum estimate of the problem of doping in sports.

International Olympic Committee (IOC) Drug Testing Results

The IOC conducts drug tests both in- and out-of-competition. Out-of-competition, short or no-notice testing is considered absolutely essential in order to detect the use of banned training drugs and/or prevent athletes from ceasing drug use in sufficient time to clear drug metabolites from their systems before an in-competition drug test.

Table 4.1
Positive Test Results at the Olympic Games by Sport (1968-1996)

Sport	Number of Positive Results
Winter Games	
Hockey	3
Nordic Skiing	2
Summer Games	
Weightlifting	20
Track and Field	11
Volleyball	4
Modern Pentathalon	3
Cycling	2
Judo	2
Wrestling	2
Basketball	1
Shooting	1
Swimming	1
Yachting	1

Source: International Olympic Committee (as cited in Shipley, A. 1999, p. D11).

International Olympic Committee (IOC) reports indicate that very few athletes fail drug tests in Olympic competition. Since drug controls were instituted at the Mexico City Summer Olympic Games in 1968, out of 14,678 tests performed, only 53 doping cases (0.0359 percent) have ever been detected and reported. Of these 53 cases, 48 (90.6 percent) occurred during the Summer Olympic Games while only five such incidents (9.4 percent) were recorded during Winter Games. Athletes competing in weightlifting and track and field comprised significantly higher proportions of positive doping cases than athletes in other sports (Table 4.1).

No doubt due in part to their noted performance-enhancing qualities, anabolic-androgenic steroids (AASs) and stimulants accounted for the overwhelming majority of positive doping cases. In total, AAS cases comprised 49.1 percent of the positive doping cases with stimulants following at 34.0 percent. Diuretics, which can be used to mask the use of other substances, accounted for the next largest group of positive doping cases at 7.5 percent (Table 4.2).

The IOC-accredited laboratories annually report the number of samples tested and the number of positive tests for both in- and out-of-competition (OOC) testing. The number of samples tested increased by more than 36 percent between 1989 and 1990. Since then, the total number of samples increased annually through 1994.[8] The percentage of samples collected using short and no-notice testing also increased from 1986 to 1994, reaching 43 percent in 1994 at a slower rate.[9]

The percentage of samples that tested positive for stimulants and anabolic androgenic steroids (AASs) stabilized at approximately 0.4 percent and one percent, respectively.[10] In 1994, diuretics, beta-blockers, and narcotics together accounted for 0.17 percent of the positive tests, and nandralone plus testosterone-to-epitestosterone ratios (T/E) greater than 6:1 accounted for approximately 52 percent of the positive test results related to AASs.[11] At the time, detection of nandralone was decreasing while detection of T/E ratios greater than six was increasing.[12] Over-the-counter (OTC) drugs accounted for 50 to 60 percent of the stimulants detected.[13]

Table 4.2
Positive Test Results at the Olympic Games by Substance (1968-1996)

Substance	Number of Positive Test Results
Alcohol	1
Anabolic Agents	
Anabolic Steroids	8
Nandralone	7
Stanozolol	4
Testosterone	3
Methandienone	2
Metenolone	2
Beta-2 Agonists	
Clenbuterol	2
Beta Blockers	
Propanolol	1
Diuretics	
Furosemide	4
Narcotics	
Codeine	1
Stimulants	
Ephedrine	6
Amphetamine	3
Coramine	2
Femcamfamine	1
Phenylpropanolamine	1
Pemoline	1
Caffeine	1
Norephedrine	1
Mesocarb	1
Strychnine	1

Source: International Olympic Committee (as cited in Shipley, A. 1999, p. D11).

Table 4.3 reflects all sports and all levels of competition and in some countries the data include body-building and other non-Olympic sports with high risk for drug use. Consequently, these data cannot be used to draw conclusions about any particular sport. Informal reports from sports federations that conduct rigorous, year-round, short-notice testing detect few positive cases.[14]

Table 4.4 presents the absolute number of positive test results reported by IOC-accredited laboratories between 1986 and 1996, broken down by detectable substance.

Consistent with previous findings, these data indicate that for the most recent year available anabolic steroids have had the highest incidence of identified use, followed by stimulants and diuretics.

Table 4.3
Annual Total and Out-of-Competition Drug Tests Performed by the IOC (1986-1994)

Year	Tests		% Positive		
	Total Number of Tests	% Short or No Notice	Total	Stimulants	AASs
1986	32,982	NA	2.1	0.54	1.33
1987	37,882	17.4	2.3	0.79	1.38
1988	47,098	24.4	2.7	0.89	1.68
1989	52,379	28.0	2.2	0.97	1.17
1990	71,341	39.6	1.4	0.48	0.81
1991	84,088	40.5	1.1	0.26	0.66
1992	87,808	41.5	1.4	0.32	0.82
1993	89,166	39.3	1.7	0.38	1.06
1994	93,680	43.2	1.5	0.37	0.95

Source: Catlin, D. H., & Murray, T. H. (1996).

United States Olympic Committee (USOC) Drug Testing Results

In 1984, the USOC was the first sports organization to begin conducting athlete drug testing in the United States. Between 1984 and 1995, the USOC conducted announced testing for all major events at a rate of 3,500 samples per year, with men accounting for about 70 percent of those tested.[15] During those 11 years there were 128 positive test results for steroids and steroid-blocking agents (including 10 women), 12 positive test results for diuretics, seven for beta-blockers, 15 for narcotics (mostly codeine and propoxyphene) and 365 for stimulants (0.89 percent of all tests).[16] The breakdown of the positive test results for stimulants was: over-the-counter drugs, 81 percent; cocaine, 6.6 percent; caffeine (greater than 12 micrograms per milliliter), 1.6 percent; amphetamines, methamphetamine, isometheptene and nikethamide, 10 percent.[17]

Because the USOC conducts testing for both national and international events held in the United States, some of these positive results were not among U.S. athletes. Conversely, USOC athletes were tested in other countries and these results were not included.

To obtain more current information (i.e., post-1995), The CASA National Commission on Sports and Substance Abuse approached the USOC with a request for updated statistics on the number of tests performed and the number of positive test results broken down by sport and by drug. The CASA Commission was not able to obtain this information from the USOC.

Table 4.4
Annual Positive Test Results Reported by the IOC by Substance (1986-1996)

Substance	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Anabolic steroids	439	521	791	611	579	652	717	995	891	986	1,131
Stimulants	177	301	420	508	340	221	277	339	347	310	281
Narcotics	23	55	58	76	62	72	102	48	42	34	37
Beta-blockers	31	33	8	6	8	10	12	13	15	14	6
Diuretics	2	9	57	45	37	47	70	66	63	59	54
Masking agents	*	24	19	10	6	1	22	23	8	3	0
Peptide hormones	*	*	*	*	1	1	4	4	3	9	4
Total	672	943	1,353	1,256	1,033	1,004	1,204	1,488	1,369	1,415	1,513

* Not tested.
Source: International Olympic Committee (as cited in Houlihan, B. 1999, p. 133).

Comparative Drug Testing Results from Australia and Canada

The Australian Sports Drug Agency (ASDA) and the Canadian Centre for Ethics in Sport (CCES) are national organizations with charters to fight doping in sports. As the administrative bodies for doping control on the Australian and Canadian Olympic Committees, the ASDA and CCES are the Australian and Canadian counterparts to the soon-to-be replaced Doping Control Administration at the USOC. For comparative purposes, their drug testing statistics are included here.

Published statistics from the ASDA indicate that a total of 4,801 drug tests were conducted on athletes between July 1, 1998 and June 30, 1999. Of that total, 1,705 tests (35.6 percent) were performed in-competition, and 3,096 (64.5 percent) were conducted as out-of-competition tests. Athletes tested positive in less than one percent of the tests. Anabolic agents, beta-2 agonists and stimulants comprised the largest number of positive test results (Table 4.5).

The CCES conducted approximately 1,800 drug tests on athletes through its domestic program in 1997 (the latest year available) of which close to 80 percent were unannounced.[18] According to their published testing results for that year: anabolic agents comprised 66 percent of the doping infractions, stimulants accounted for 17 percent, refusals to submit to testing made up 13 percent of the "positive" test results and diuretics comprised four percent.[19] During the entire period from 1987 to 1997: anabolic agents comprised 74 percent of all doping infractions, refusals to submit to testing accounted for 13 percent overall, stimulants made up nine percent of the positive test results and diuretics comprised four percent.[20]

These drug-testing results differ slightly from those found by the USOC. More specifically, drug-testing results from the USOC indicated stimulants to have the highest levels of athlete use (roughly twice that of the next class of substances), followed by anabolic steroids, narcotics, diuretics and beta-blockers. Findings from the drug-testing results from Australia and Canada indicate use of anabolic steroids to be the most prevalent, followed by stimulants and diuretics.

USA Track and Field Drug Testing Results

USA Track and Field (USATF) is the national governing body for track and field, long distance running and race walking in the United States. According to testimony before The CASA National Commission on Sports and Substance Abuse from an official at USATF, in 1998, the USATF's anti-doping program administered 737 tests with seven positive results (0.949 percent).[21] Testing is conducted by the USOC and the International Amateur Athletic Federation for the USATF. In 1999, through December 15th, they administered 876 tests with 11 positive results (1.26 percent) that have made it through the adjudication process.[22]

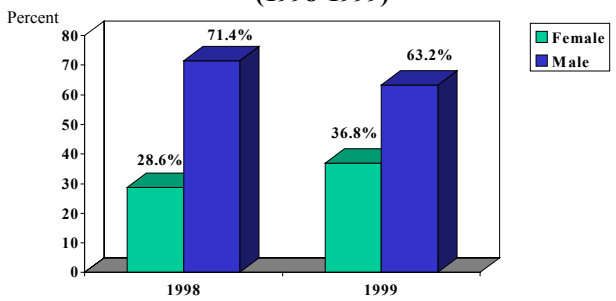
Table 4.5
Positive Results Reported by Austrialian Sports Drug Agency (July 1998-June 1999)

Substance	Total Number	% of Positive Results (N=43)	% of Total Tests (N=4,801)
Anabolic agents	12	27.9	0.25
Beta-2 agonists	12	27.9	0.25
Diuretics	2	4.7	0.04
Narcotic Analgesics	1	2.3	0.02
Stimulants	11	25.6	0.23
Cannabinoids	2	4.7	0.04
Failure to comply	3	7.0	0.06

Source: Australian Sports Drug Agency. (2000b).

The percent of positive test results for men was roughly twice that of women. However, the percent of positive results in women increased significantly (over 20 percent) between the two years while it decreased in men over the same time period (Figure 4.A).[23]

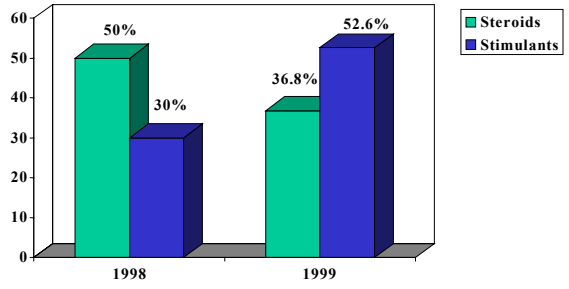
Figure 4.A
Percent of USA Track and Field Positive Test Results by Gender (1998-1999)



Source: Jill Pilgrim, General Counsel and Director of Business Affairs, USA Track and Field (personal communication,December 22, 1999).

According to statistics provided by USATF officials, stimulants are the most significant problem facing USA Track and Field (Figure 4.B).[24] While substances detected include steroids, stimulants and diuretics, most of the athletes tested positive for the sympathomimetic amines (particularly pseudoephedrine) found in over-the-counter cold medications. Many of these positive test results were said to be found in younger, high school age athletes who may not have been fully aware of the rules regarding these substances. Use of a masking agent and failure to provide a urine sample are considered to be equivalent to a positive test result.

Figure 4.B
Percent of USA Track and Field Positive Test Results by Substance (1998-1999)



Source: Jill Pilgrim, General Counsel and Director of Business Affairs, USA Track and Field (personal communication,December 22, 1999).

Government Reports of Doping

Recent findings from government investigations depict doping as a problem of greater magnitude than that suggested by drug-testing statistics. During governmental hearings, current and former athletes, coaches and sport federation officials, with few exceptions, have supported the notion that there is a significant doping problem.[25] In the worst possible scenario, reports indicate that governments, in obvious violation of their public trust, have even sponsored doping activities in their athletes.[26]

> *I feel sorry for Ben Johnson. All sportsmen--not all, but maybe 90%, including our own--use drugs.*[27]
>
> --Anonymous Soviet Coach
> October 1988

As with other data sources regarding doping in sport, government investigations are not without limitations. From a methodological perspective, using the volunteered opinions and observations of a relatively small sample of individuals, selected in a nonrandom manner, to estimate the extent of doping is less than ideal.[28] Individuals who use or have used drugs and who serve as informants may project their behavior onto others in an attempt to rationalize their drug use, resulting in an overestimate of drug use.[29] Conversely, athletes and others may refuse to cooperate with government inquiries to shield themselves or to protect their teammates, coaches, federations, and/or their individual and collective reputations,[30] resulting in an underestimation of use.

Government reports on athlete drug use have originated from around the world. Prevalence estimates from this data source range from findings similar to drug testing statistics from the National Governing Bodies of sport on the low side to 90 percent for some government-instituted doping programs.[31] In Germany, the former sports

chief of the German Democratic Republic (the "Sportfuhrer") was recently convicted for employing a systematic doping policy and administering anabolic steroids to thousands of athletes, many of whom were not even aware of what they were taking.[32] During U.S. Congressional hearings on performance-enhancing drugs, current and former athletes as well as coaches and sports federation officials testified that significant doping problems exist at all levels.[33]

China Cuts 40 From Games Team Amid Drug Concerns

China has informed Australian Olympic authorities it has cut 40 athletes and officials--10 percent of the total--from its national team for the Sydney Games starting next week....[34]

--Reuters
September 5, 2000

After 91 days of testimony initiated as a result of the Ben Johnson doping incident in the 1988 Seoul Olympic Games, Canada's Dubin Commission concluded that "the noble sentiments and lofty ideals proclaimed in the Olympic Charter are a far cry from the reality of international competition."[35] They also referred to a "conspiracy of silence" and a "pact of ignorance" among those in sport when it comes to discussing drug use as a result of their investigations.[36] During the 1998 Tour de France, cycling's premier race, a team masseur for the French-based Festina team submitted documentation and testified to authorities about how he assisted hundreds of elite cyclists take performance-enhancing substances over the course of 20 years.[37]

Journalistic Accounts and Expert Testimony About Doping

The writings and testimonials of athletes and others involved with sport also confirm that doping is a serious problem throughout international sport.[38] Presenting the same potential problems as findings from governmental reports, journalistic reports must be viewed judiciously. However, given the sheer number and scope of credible reports that have been written over the past four decades regarding athlete substance use, many people no longer view significant achievements in sport to be achievable without the help of some substance. Such reports have become ubiquitous. Journalists, using primarily the personal observations, accounts, or opinions of self-selected informants, both anonymous and attributed, have detailed a sustained epidemic of drug use in sport at all levels.[39] According to the Assistant Managing Editor for Sports at *The Washington Post*, "A week rarely goes by where we don't have a front page story on drugs--and a day doesn't go by where we don't have an item on drugs."[40] Prevalence estimates from journalistic reports reach up to 90 percent.[41] To illustrate, consider the following recent headlines:

- "Positive on testing: But will the Olympic Games get clean this year - or ever?" from *U.S. News and World Report*, August 14, 2000
- "IOC Approves EPO Tests for Sydney" from The Associated Press, August 1, 2000
- "Chinese world-record holder loses Olympic spot after drug test" from The Associated Press, July 6, 2000
- "New Olympic Doping Accusations Cast Shadow" from *The New York Times*, June 22, 2000

As doping practices have grown and become more public, particularly in the Olympics, public perception of athletes is changing. Outstanding performances are viewed with skepticism and the question of drug use always emerges. According to Don Talbot, coach of the Australian swim team, "It's an unfortunate fact of life now that anybody that swims fast or makes big improvements, immediately comes under suspicion. It's really sad because good athletes should be able to glory in their wins and not be criticized for them."[42]

Chapter V
The Rules: Standards and Enforcement

Over the past three decades, the public has heard representatives of the governing bodies of Olympic and international sport* state on numerous occasions their commitment to drug-free competition. These regulatory bodies have developed extensive rules, monitoring processes and sanctioning systems.[1] Since 1968, Olympic governing bodies have banned hundreds of substances. Yet, doubts about the effectiveness of these efforts plague Olympic sports.

Governing Bodies

> *The fear is that athletic competition will become a competition between pills, not skills, and that the sports champions of the future will be chemically created.*[2]
>
> --James B. Jacobs and Bruce Samuels
> Center for Research in Crime and Justice
> New York University School of Law

Governing bodies in sport deem the use of performance-enhancing drugs incompatible with the basic principles of athletic competition. They ban these substances because they threaten the health of athletes and provide an unfair advantage--allowing the drug user to cheat by surpassing "natural" performance levels. Governing bodies of international sports face, however, complex problems in developing, implementing and enforcing an effective anti-doping program. From a legal and regulatory perspective, some of the problems which must be solved to make a fair and effective drug-testing program a reality include:[3]

- Keeping pace with fast-breaking developments in the pharmacology of performance enhancement and deciding which substances to ban,

* The International Olympic Committee (IOC), International Sports Federations, National Olympic Committees and National Governing Bodies.

- Assuring timely and effective notice to athletes as to which substances are banned,
- Developing highly accurate tests for the performance-enhancing substances in the body,
- Overcoming the logistical problems of obtaining and transporting athletes' testing samples,
- Establishing and accrediting testing laboratories around the world, and
- Developing a system of enforceable sanctions.

The sports governing bodies are not experts in the field of drug testing. Addressing these issues is further complicated by the conflict of interest inherent in having the governing bodies responsible for promoting their sport be the primary monitors and adjudicators of athlete drug use.

The International Olympic Committee (IOC)[*]

The IOC, headquartered in Lausanne, Switzerland, is the central governing body and "supreme authority" in Olympic sport.[4] It creates rules and procedural guidelines for Olympic decision-making, selects host cities for the Olympic Games, determines qualifications for athletic participation and establishes procedures for electing its own officers and representatives.[5] The IOC consists of 113 members selected from countries that have a formally recognized National Olympic Committee.[6] IOC members are representatives of the IOC in their home countries, not national delegates to the IOC.

The IOC's powerful Executive Board, composed of a President, four Vice Presidents and ten at-large members, decides "all matters of doubt or dispute that are of a nontechnical nature concerning the Olympic Games and the Olympic Movement."[7] The Board "may take action on its own initiative or upon request of a member of the IOC, a National Olympic Committee, an International Federation, or an Organizing Committee for an Olympic Games."[8] In addition to this broad jurisdictional power, IOC decisions are not reviewable because it has "final authority on all questions concerning the Olympic Games and the Olympic Movement," and that includes all questions related to doping.[9]

> *If there's bribery in [selecting] Olympic cities, there's bribery in drug testing.*[10]
>
> --Mark Tewksbury, three-time Olympic medalist, member of the Canadian Olympic Association and of international swimming's athlete commission, during his resignation from his Olympic posts in protest over "the inability of the IOC to seriously clean its own house"

History. A central issue faced by the IOC is determining what substances to ban. This process appears to date to have been more reactive and anecdotal than consistent and planned. Even prior to the advent of the Modern Olympiad in 1896, the use of substances by athletes to enhance personal performance appeared to be generally common practice within the international sporting community.[11] Extensive and frequently unregulated experimentation with drugs during World War II (particularly amphetamines and steroids) greatly increased scientific knowledge about the properties of these drugs and demonstrated the opportunities for their use outside a therapeutic context. Throughout the 1950s, cyclists were the main group of athletes thought to be heavily involved in drug abuse, though drug taking was also considered to be rife in professional boxing and several speed-skaters became ill through the over-use of amphetamines during the 1952 Helsinki Olympics.[12]

Until the mid-1960s, however, concerns about "doping" were confined to a few physicians and medical researchers within sport. Their private

[*] See Appendix A for international sports organization chart.

concern had yet to reach the public forum.[13] Although some countries began expressing concern that drugs were harming both the integrity of sports and the health of athletes, it was not until a Danish cyclist died during the 1960 Games in Rome, reportedly from ingesting amphetamines mixed with a nicotine acid derivative administered by his coach, that international sports federations perceived a serious threat.[14]

Early Response to Doping. In 1961, the IOC established a Medical Commission to examine the problem of doping and, in 1962, passed a resolution condemning the practice of doping in sports.[15] At a meeting of a convention of the Council of Europe sports governing bodies in 1963, the IOC adopted a definition of doping: "the administration to, or the use by, a competing athlete of any substance foreign to the body or any physiological substance taken in abnormal quantity or by an abnormal route of entry into the body, with the sole intention of increasing in an artificial and unfair manner his performance in competition."[16] There were serious difficulties with elements of this definition. What is the practical meaning of "any substance foreign to the body?" How does one scientifically determine what are abnormal quantities or routes of administration? Ambiguity within this definition, especially in the absence of sophisticated screening methodologies, complicated the work of the Medical Commission.

First Doping Control Policies. The 1964 Olympics in Tokyo marked the first IOC attempt to initiate some form of doping control.[17] The International Olympic Committee, however, did not become a committed and active participant in the anti-doping movement until after the televised death of British cyclist Tommy Simpson, caused by the illegal use of amphetamines during the 1967 Tour de France.[18] The Medical Commission of the IOC was reorganized in 1967 with a mandate to establish a medical control service for the 1968 Winter and Summer Olympics to study the issue of doping controls and identify the assistance that could be provided to athletes in developing countries.[19] Three basic principles governed the work of the IOC Medical Commission: (1) protection of athlete's health; (2) defense of sports ethics; and, (3) equality for all participants at the moment of competition.[20]

In the 1960s, early drug testing efforts concentrated primarily on the sport of cycling and the detection of amphetamines--the most widely used drug at that time. Testing methods were relatively unsophisticated and often produced inaccurate results having, therefore, little deterrent effect. During this time, awareness of the use of anabolic steroids was growing. There was, however, no reliable test for this class of drugs.[21]

> *...in the last decade 27 Chinese swimmers have tested positive, at world meets, for banned substances. The world swimming federation, regarded as tough on drugs, caught them. The IOC didn't.*[22]

Expansion of Doping Control. The first Olympic Games with relatively comprehensive testing across all sports were the 1972 Munich Games. Tests were conducted for stimulants (e.g., amphetamine, ephedrine) and narcotics (e.g., heroin, morphine). Even though it was common knowledge that the major drugs abused by athletes had shifted from stimulants to anabolic steroids, the continued lack of a reliable test to detect steroid use precluded both screening for these drugs and including them on the IOC's list of banned substances.[23]

During the 1970s, a reliable test for many drugs in the steroid class was developed. As a result, they were added to the IOC's list of banned substances in 1975 and first officially screened for during the 1976 Montreal Games.[24]

In 1981, the Medical Commission created the Doping and Biochemistry of Sport Sub-commission to prepare the list of banned substances and establish testing procedures. Outside sources from all parts of the sports world were asked to propose substances for the banned list.[25]

As testing technologies improved, the IOC gradually expanded its prohibited substances list. Testosterone and caffeine were added in the early 1980s, beta-blockers (e.g., propranolol, acebutolol) and blood-doping (i.e., administration of blood, red blood cells or related blood products to an athlete) in 1985, diuretics (e.g., acetazolomide, bumetanide) in 1987 and peptide hormones (e.g., human growth hormone) in 1990.[26]

Current Doping Control Policies. Effective January 1, 2000, the IOC's Anti-Doping Code prohibits the following classes of drugs: (1) stimulants, (2) narcotics, (3) anabolic agents (including anabolic androgenic steroids and beta-2 agonists), (4) diuretics, and (5) peptide hormones, mimetics and analogues. Under certain circumstances, specified in the Code, the following are also prohibited: cannabinoids, local anaesthetics, corticosteroids and beta-blockers.[27] (These classes of drugs and their pharmacology are described in Chapter 3, The Pharmacology of Competition.). In addition to these substances, the practices of blood doping and pharmacological, chemical and physical manipulation to mask or otherwise influence drug test results are also prohibited by the anti-doping policy currently in effect. (See Appendix B for a sample summary of drug regulations.)*

International Federations (IF)

The IOC delegates all technical matters of a particular sport to the International Federation (IF)--the International Governing Body--of that sport. An IFs' responsibilities include: selecting Olympic officials, determining athlete eligibility, defining the technical rules for international competition, imposing sanctions for rule violations, drug testing athletes and resolving disputes. The International Amateur Athletic Federation (IAAF) is the IF for Track and Field, the Union Cycliste Internationale (UCI) is the IF for cycling, the Federation Internationale de Football (FIFA) is the IF for soccer, etc. To be recognized by the IOC, an International Federation must agree to comply with the Olympic Charter, show compliance with IOC criteria and receive approval by the IOC Executive Board. The IOC has the authority to revoke recognition if the International Federation fails to comply with any of the requirements.[28]

The National Governing Bodies (NGBs) from each country for a particular sport comprise an International Federation's membership.[29]

National Olympic Committees (NOC) and National Governing Bodies (NGB)

A National Olympic Committee is responsible for its country's representation at the Olympic Games. To be recognized by the IOC, a National Olympic Committee must agree to abide by IOC rules. Established by Congress in 1896, the United States Olympic Committee (USOC) is the National Olympic Committee for the United States.[30]

The U.S. Congress greatly expanded the USOC's authority to develop and govern amateur sports in the United States by passage of the Amateur Sports Act of 1978. The Act allows the USOC to delegate much of its sport development and governance responsibilities to the National Governing Bodies (NGBs) of each sport. An NGB is the sports governing body for a particular sport within a single country. For example, USA Track and Field is the NGB for track and field within the United States. To gain recognition as an NGB in the United States, an organization must receive USOC approval;[31] however, the NGBs operate independently of the USOC.[32] If approved, the USOC recommends the NGB to its respective International Federation as the U.S. representative for that sport.[33]

* Appendix B contains summaries of the current drug regulations for the IOC, International Amateur Athletic Federation (IAAF), Union Cycliste Internationale (UCI), and Federation Internationale de Football (FIFA), including criteria for the selection of athletes for testing and sanctions. Where appropriate, specific substances and procedures that are prohibited, including cut-off levels for the applicable substances, are included.

Overlapping Doping Regulations and Sanctions

Depending on the country and sport, each governance level (i.e., the IF, NOC and NGB) has its own set of doping regulations, testing practices, and sanctioning systems. However, in addition to complying with the rules of its National Olympic Committee, an NGB also must conform to the rules and regulations of its International Federation.[34] Similarly, in doping matters, athletes must comply with the regulations, testing practices and sanctioning systems of all governing bodies relevant to both their country and sport.

Critics argue that these differences in doping policies are a major part of the problem with the anti-doping system currently in place in international sports. For example, depending on the specific event, sport, and country in question, an athlete may be subject to either: in-competition or out-of-competition testing with or without advanced notice, or some combination of these different testing programs. The selection criteria for athletes to be tested can range from being totally random to involving solely the top finishers in a competition or those considered to be "reasonably suspicious" of having used drugs.

All International Federations ban all the major classes of performance-enhancing substances and masking procedures, but there can be subtle differences in how certain substances may be treated in terms of cut-off levels (e.g., testosterone to epitestosterone ratios are allowable up to a level of 6:1 under IOC regulations, but can reach as high as 10:1 before being considered a doping infraction under International Tennis Federation rules[35]) and/or other restrictions (e.g., alcohol being banned in the Olympics only for shooting and archery events). These differences can cause several problems as athletes must be informed continuously of additions and changes to the banned substances lists.

Sanctioning systems vary greatly as well, and may or may not depend on the substance abused. For example, the regulations of the international federation for cycling (i.e., Union Cycliste Internationale) impose differential sanctions depending on gender and the level of competition during which a doping infraction occurred. Such discrepancies cause a great deal of confusion for everyone involved with preventing the use of banned substances. From the Governing Bodies' perspectives, an international arena coupled with a multitude of different governance levels makes the uniform application and enforcement of sanctions difficult to implement. From the athletes' perspectives, however, failure to do so creates a lack of faith in the fairness of the anti-doping system.

The World Anti-Doping Agency (WADA)

In recognition of the fact that the Olympic governing bodies cannot regulate all aspects of the fight against doping in sport, the World Anti-Doping Agency (WADA) was established on November 10, 1999 in Lausanne, Switzerland.[36] The Agency's principal task is "to coordinate a comprehensive anti-doping program at the international level, laying down common, effective, minimum standards, compatible with those in internationally recognized quality standards for doping controls, particularly with regard to out-of-competition controls, and seeking equity for all athletes in all sports and in all countries."[37] For these purposes, the International Sports Federations "while preserving their autonomy and their own authority, agree to cooperate with the Agency and coordinate their respective anti-doping programs with it in order to ensure that duplication is avoided and that the same application is achieved worldwide."[38] Thus, working primarily with and through the IOC, the International Sports Federations, the National Olympic Committees, governments and the athletes, WADA's goal is to seek and obtain from all of the above the moral and political commitment to follow its recommendations. When fully appointed, WADA's Board will consist of equal representatives from the Olympic Movement and public authorities (i.e., governments, intergovernmental organizations and other public and private bodies fighting against doping in sport).[39]

The WADA Board of Directors is comprised of 32 members, 16 from the Olympic Movement and 16 from public authorities; there are provisions for adding three additional members. To help launch WADA, IOC Vice President (and Chairman of the IOC Marketing Commission) Richard W. Pound (Canada) was appointed WADA's first Chairman and the IOC provided US $25 million for the initial two years of WADA operations. At the end of these two years, Mr. Pound is expected to step down and the public authorities are expected to contribute some share of WADA's funding. The exact division of responsibility for WADA's funding after the initial two years has yet to be determined.[40]

Despite its laudable goal of coordinating a comprehensive, international doping program, WADA's role is ultimately limited to making recommendations to the IOC.[41]

The United States Anti-Doping Agency (USADA)

On December 3, 1999, the USOC Select Task Force on Drug Externalization called for the creation of a new independent organization, the United States Anti-Doping Agency (USADA) to enhance the credibility and effectiveness of U.S. efforts to deal with the issue of doping in elite sports. The Task Force concluded that a new organization could "expand and improve upon the programs for anti-doping that currently exist" and alleviate the "inherent conflict of interest between the NGBs and their athletes" that results from the NGBs prosecuting doping-related infractions.[42] The creation of the USADA presents the opportunity to "support athletes and to seek harmonization of the procedures and practices of the NGBs and their International Federations and the IOC."[43]

As of October 1, 2000, the USADA will replace the USOC's current Anti-Doping Administration and assume the task of developing a national anti-doping program in the United States relating to U.S. participation in the Olympic, Pan American and Paralympic Games. The USADA also will be responsible for sample collection, testing, adjudication, sanctions and research for elite level sports in the U.S. The USADA will be incorporated as a nonprofit, nonmember corporation. The Board of Directors will be comprised of nine individuals--two members elected by the USOC Athletes Advisory Council, two members elected by the USOC NGB Council, and five public sector members.[44]

The new proposed adjudication procedures differ from current processes in three important ways: (1) prosecution will be the responsibility of an independent organization with no conflicting interest in the outcome; (2) all findings will be made public upon completion of the hearing process; and, (3) public reports indicating the number of positive tests and adverse findings will be issued periodically by USADA. Appendix C presents the adjudication processes to be implemented by the USADA.

Compared to the $3.05 million per year the USOC spends on its anti-doping program, the Task Force estimates that the initial annual budget for the USADA will be at least $6 million per year.[45] This budget would include but not be limited to: research and development (estimated to be at $2 million per year), collection and testing (estimated at $2.4 million for 6,000 - 8,000 tests per year), salaries, legal and consulting fees, Board compensation, liability insurance and overhead.[46] The USADA, in cooperation with the USOC, will pursue federal and sponsorship funding to support additional research.[47] Initial funding from the federal government ($3 million) and the USOC ($3.7 million) already has been secured.[48] Future funding sources have yet to be determined.

The Court of Arbitration for Sport (CAS)

The main arbitrating body for doping disputes in international sports is the Court of Arbitration for Sport (CAS), established by the IOC in 1983.[49] Although the sports community submitted cases to the CAS, there was concern that its close association with the IOC compromised its independence. To provide a greater degree of independence for the CAS, the IOC, along with the International Federations

and the National Olympic Committees, created the International Council of Arbitration for Sport (ICAS) in 1993.[50]

The International Council of Arbitration for Sport is a 20-member council, composed of jurists appointed for a renewable period of four years. The ICAS appoints CAS arbitrators. The IOC appoints 20 percent of the ICAS members. The IOC has no direct authority to appoint CAS arbitrators, but maintains some influence by its appointment of ICAS members and by its proposal of CAS arbitrators.[51]

The CAS Code also provides International Federations limited influence to select International Council of Arbitration for Sport members and to propose CAS arbitrators. Several International Federations have amended their statues to establish the CAS rather than themselves, as the exclusive, final tribunal for appeal, and all International Federations have agreed to submit doping disputes to the CAS. This prevents an International Federation from acting as both prosecutor and judge in the same case.[52]

The International Council of Arbitration for Sport, rather than the IOC, now oversees the administration and financing of the CAS, but many of the procedural rules remain unchanged. The most important difference is that the IOC no longer has direct operational control of the CAS.[53]

Arbitration, as an alternative to litigation, offers two major advantages to athletes. First, arbitration is typically less expensive that litigation, making dispute resolution available to a greater number of athletes. Second, arbitration generally provides quicker resolution of disputes than litigation. Because elite athletes generally have short careers, even minimal suspensions can have major consequences. For example, athletes may lose their only opportunity to participate in the Olympic Games during a suspension period or may find that they are unable to compete at their previous skill level at the end of a suspension period. Further, the suspension period may end before a court resolves the dispute, making the lawsuit moot. Although an athlete may pursue a subsequent damage claim, courts may be unable to ascertain damages with any degree of certainty. Thus, CAS arbitration could allow an athlete who prevails in a dispute an expeditious return to competition.[54]

A system of dispute resolution that is fair, inexpensive and fast benefits Olympic athletes. The CAS may provide a less expensive and more expedient choice for dispute resolution in Olympic sport, but its widespread use depends on athletes' informed consent to CAS jurisdiction and their belief that the system is fair. As a result of the secretive nature of these proceedings--the general unavailability of information due to closed-door hearings and unpublished decisions--some athletes may fear that the CAS is unpredictable and inconsistent.[*] [55]

The Athletes' Response

According to a former world record holder in the marathon, "regulating authorities in the sports world and the public need to recognize what all athletes striving to be their best have learned early in their careers--that everything they do to prepare for competition is with the hope that it will enhance their performance."[56] In this age of information and technology, athletes are very knowledgeable about every conceivable means of performance-enhancement that are available. They know exactly what their peers are doing to prepare for competition--and what seems to be the most successful. Whether they indulge in such practices, they are equally aware of nonlegitimate practices such as doping.[57]

> *I want testing. It's a pain in the neck but it's not anything like having a dirty Olympics*.[58]
>
> --Richard Quick, Head Coach
> U.S. Olympic Swimming Team

[*] See Appendix D for a summary description of "The Necessary Components of an Anti-Doping Agency or Program" from The Duke Conference on Doping in Sport held May 7-8, 1999 at The Center for Sports Law and Policy, Duke University School of Law.

In general, athletes fall into one of three categories in their perspective on doping. At one end of the spectrum, there is the group that has no values that conflict with doing whatever it takes to succeed, whether it is within the rules or not. These individuals see doping as a legitimate means to an end, and justify doping on any of a variety of different grounds. At the other far end of the spectrum are those athletes who will not engage in any conduct outside of the rules or that they consider unethical or unfair. These athletes would rather lose than succeed by what they consider to be cheating.[59] Within both of these extreme groups, any form of intervention is unlikely to effect any substantive difference in athlete behavior.

> *I'd like to know he's been tested...I bet he would like to know I've been tested. It's something that makes you feel the playing field is even.*[60]
>
> --Ed Moses
> U.S. Olympic Swimmer

In the middle are athletes who may have tried, perhaps for years, to compete within the rules but have become frustrated at the apparent ease with which cheaters beat the system. Many feel that National Governing Bodies and regulating authorities are not doing everything possible to stamp out doping, but are merely making a public relations effort to appear to do so. They may believe that those authorities are more driven to protect the image of their respective sport and the money flowing into that sport from corporate sponsors than to solve the doping problem. Eventually, they may concede that they have no choice but to dope if they are to remain competitive.[61]

Throughout the prior decade, several athletes have attempted to take the initiative in addressing doping in sport:

- In 1990, German decathletes demanded regular doping tests. In 1993, they formed a "Decathalon Team" independent of their sports officials, sought their own sponsors, and promulgated a doctrine of drug-free sport. Together with Dr. Manfred Donike, they developed a pilot project for steroid profiling.[62]

- In 1990, German high jumper Dietmar Mogenburg called for steroid profiling.[63]

- In 1994, more than 100 French athletes sent a letter to IOC President, Juan Antonio Samaranch, asking for action in regards to the threat presented by traffickers involved in the black market for steroids. To date, the IOC has neither investigated nor protested the systematic diversion of large quantities of synthetic hormones to the black market that makes doping possible.[64]

- In 1995, members of the international swimming community called for the suspension of entire teams if multiple athletes from a single country were found to have engaged in doping within a single year.[65]

- In 1997, German athletes' representatives demanded the consistent application of anti-doping rules following the misbehavior of Greek athletes and coaches vis-a-vis an International Amateur Athletic Federation (IAAF) drug inspector that was ignored by the IAAF and the IOC.[66]

- Following the discovery of repeated doping infractions by Chinese swimmers in 1998, World Swimming Coaches' Association members, John Leonard (United States) and Forbes Carlile (Australia), publicly stated that investigations done by the international federation for swimming, (i.e., the Federation Internationale de Natation Amateur) into doping charges against members of the Chinese and German championship teams, were merely "an exercise in damage control." Further, they called for a "thorough investigation of China's swimming program by a panel of independent experts."[67]

- In March 1999, the representative of the German swimmers, Chris-Carol Bremer, called for state intervention against doping. Further, German swimmer Sandra Volker publicly expressed a lack of confidence in the official anti-doping campaign and called for the introduction of blood tests.[68]

> *You'd have to be an imbecile or a hypocrite to imagine that a professional cyclist who rides 235 days a year can hold himself together without stimulants.*[69]
>
> --Jacques Anquetil (1967)
> Five-time Tour winner

- In October 1999, the athlete organization, Olympic Advocates Together Honourably (OATH), released a report stating that "new doping control measures must be rooted in sport ethics and values; flow from athlete agreement; and be independently, accountably, and fairly administered."[70] They articulated that the fight against doping is international--requiring cooperation and partnerships--and that anti-doping efforts require an international anti-doping agency. Toward that end, the IOC must "go to the experts to create this anti-doping agency" and "be prepared to relinquish control of the new agency in order to secure independence and a genuine international partnership."[71]

The IOC Athletes' Commission, responsible for acting as the mediator between Olympic athletes and the IOC, has recommended the adoption of "doping passports." Such a passport would be an accessible and public history of an athlete's doping tests, including health history, hormone levels, hematocrit and other relevant data.[72] While concerns undoubtedly will be raised about athlete privacy and confidentiality, doping passports could rectify the situation of athletes who are unfairly penalized for having natural hormone or other biochemical levels outside the range of what is considered normal (e.g., athletes who naturally have a hematocrit over 50). Passports also would provide the type of open record necessary to help restore the integrity of sport.

The fact that athlete initiatives such as these appear to have been ignored adds to athletes' perceptions of passivity and complicity on the part of Olympic and federation officials. Athlete initiatives alone have not worked, perhaps, because the elite athlete population is too young, too transient or too disorganized.[73] As one elite athlete has stated, "We athletes are all solitary figures. We lack a charismatic leader, a spokesperson who is fighting for our cause and unifying many voices. And we don't communicate with each other."[74]

Chapter VI
Recommendations and Next Steps

To protect the health of athletes and the children who model their behavior and the integrity of Olympic sports, doping practices must be removed from Olympic competition. The evidence is clear: many performance-enhancing substances can cause serious harm when used in the methods and levels designed to provide competitive advantage. For too many substances, we simply do not know the long-term consequences of their use, and substances that seem safe for adults may be dangerous to youth.

The Olympic Games have come to be viewed as the pinnacle of modern sport. The thousands of participating athletes, coaches and officials, and a vast international audience bear witness to the prestige and popularity of the games and help us understand the powerful hold of sports on the public's imagination. As captured by the Olympic motto "*Citius, altius, fortius*" (swifter, higher, stronger), ideally the Olympic athletes portray some of the more poignant examples of triumphs of the human spirit. While the use of performance-enhancing substances in sport has existed since the origins of sport itself, today the size and magnitude of doping practices and the disincentives to curb such practices threaten to destroy the integrity of the Olympic games. Some believe that this time has already come.

> *If we will have reached a point of no return with this win at all costs attitude, the gold medals won't shine as brightly, the flags won't wave as boldly, the torch will flicker dimly, and we will have lost one of the greatest treasures ever known.*[1]
>
> --Robert Voy, MD
> Former USOC Director of
> Doping Control Administration

Because the stakes are so high for all involved, no single entity--athletes, coaches and trainers, Governing Bodies, corporate sponsors--has been able to break the thrall of doping. Getting

doping out of sports will require the political will of all involved. National governments must demand change and the creation of needed standards and systems to restore integrity to Olympic sports.

The CASA National Commission on Sports and Substance Abuse presents the following roadmap:

- **Participant nations--and the other key players--should demand that Olympic level athletes be free of performance-enhancing substances.** Nations must garner the political will to act in order to protect the health of athletes, preserve the integrity of sport and send positive messages to children. They must lead the way to build support for getting doping out of sports. Parents who organize and promote athletic events for their children should send clear messages against doping in sports. Current and former Olympic athletes should be enlisted to demand and support anti-doping policies. Coaches and trainers should set anti-doping standards and reinforce them with positive messages of substance-free competition. Corporate sponsors should show leadership by championing drug-free sports and by demanding that athletes be substance-free for the games they sponsor.

  Public support exists in the United States for this position. Americans disapprove of the use of performance-enhancing drugs by athletes and view these substances as health hazards. Nearly as many young Americans (83 percent) disapprove of such drug use as adults (86 percent).[2] Among those age 12 to18, 73 percent say that young people are harming themselves or running the risk of damaging their health when they take performance-enhancing drugs. A 77 percent majority of adults agree that Olympic sponsors should become more involved in reforming the Olympic movement and 76 percent say that Congress should take steps to make sure that athletes who compete in the 2002 Salt Lake Winter Games are drug-free.[3]

- **Participant nations should ensure that an independent international organization exists with authority over the methods of measurement and sanctions for doping in Olympic sports.** This organization would not report to the IOC or any sport governing body. It would have responsibility over the types of substances to ban; the types of tests to be conducted; the timing of those tests, the sample collection, analysis and reporting processes; adjudication referral and adjudication. This organization should develop consistent standards for the detection of performance-enhancing substances and sanctions for their use, and assure consistent use of these standards and sanctions throughout the Olympic movement. The IOC should commit a percentage of its overall budget to support this effort.

- **Conduct research needed to determine long-term consequences of use of performance-enhancing substances.** Priorities for research to determine the long-term consequences of performance-enhancing substances include: the health effects of products that are sold as nutritional supplements, especially androstenedione, creatine and ephedrine; and the efficacy and long-term effects of steroid use, including precursor substances.

- **Expand and improve cost-effective testing.** Priorities to expand and improve cost effective testing include: an international collaborative effort, funded over a five-year period at a total of at least $50 million to $100 million, to find and develop reliable tests to detect the use of the major performance-enhancing drugs; inexpensive testing procedures for steroids; cost-effective methods to detect use of human growth hormone (hGH) and insulin-like growth factor (IGF-1); and methods of keeping pace with the development of new drugs as they emerge. Testing should be done on the basis of the best available technology, whether it is a test for a substance in the urine, blood, hair, sweat or

oral fluids or is a test of the performance-enhancing effects of a substance. Research should be peer-reviewed to assure credibility and increase acceptability in the adjudication process.

- **Conduct comprehensive out-of-competition testing.** Comprehensive out-of-competition testing is essential to an effective doping program. Event or in-competition testing is useful for detecting substances that provide relatively fast-acting performance benefits for the user (e.g., stimulants to delay or reduce fatigue). However, many substances provide the greatest benefits to athletes when used during training (e.g., steroids to increase muscle mass). If only in-competition testing is used, athletes may cease using a banned substance in sufficient time to clear its metabolites from their systems. The only way to detect use of these banned training drugs is through a no-advance notice, out-of-competition testing program.

- **In the United States, strengthen the provisions of the Dietary Supplement Health and Education Act of 1994.** Athletes claim that they may unknowingly take banned substances in unlabeled or poorly labeled nutritional supplements. Congress should require manufacturers of dietary supplements to identify all contents and to label their products accurately. Concerns about youth mimicking athletes' behavior and ingesting substances which may be harmful or for which long-term effects are unknown provide another reason for Congress to act. Any claims of results now permitted under the Act related to structure and function should be supported by peer-reviewed research. Congress should consider regulating testosterone precursors as drugs rather than as nutritional supplements.

- **Adopt Athlete Passports.** A "doping passport"[*] [4] is an accessible and public history of an athlete's doping tests.[5] Health histories of athletes, with hormone levels, hematocrits and other data spanning several years can be incorporated into this document.[6] Such a passport could rectify the situation of athletes who are unfairly penalized for having natural hormone or other biochemical levels outside the range of what is considered normal (e.g., athletes who naturally have a hematocrit over 50). Publically available passports would provide the type of open record necessary to help restore the integrity of sport.

- **Adopt a standard protocol for establishing the banned substances list.** To determine which substances to ban in Olympic competition, an independent organization should adopt an open and public process based on current scientific evidence and grounded in consistently applied rules. This process should be applied to new candidate substances as they are developed and eventually to the current list of banned substances in order to identify those to be added or removed. (Appendix E)

  Any framework for making these decisions must be grounded in the IOC's basic philosophy that the use of these drugs is contrary to the fundamental principles of Olympic competition, sports and medical ethics, using its current definition of doping as the starting point.[†] A specific substance should undergo the following levels of analyses: (1) Is the use of this substance associated with severe adverse effects, life-threatening illness, or premature death?

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[*] Proposed by the IOC Athletes Commission which is responsible for acting as the mediator between active Olympic athletes and the IOC.

[†] As of January 1, 2000, doping is defined as: (1) the use of an expedient (substance or method) which is potentially harmful to athletes' health and/or capable of enhancing their performance, or (2) the presence in the athlete's body of a Prohibited Substance or evidence of the use thereof or evidence of the use of a Prohibited Method.

(2) Does use of this substance enhance athletic performance? (3) Can this substance be used as a masking agent? If the answer to any of these question is yes, the substance would be banned.

If a substance is banned, the next question is whether or not there is a reliable, valid and affordable test for this substance or method. If not, research needs should be identified and enforcement based on observation of use. If a test is available, enforcement should be based on testing and observation.

Chapter I

Notes

[1] Houlihan, B. (1999), p. 33.
[2] Houlihan, B. (1999), p. 33; Wadler, G. I., & Hainline, B. (1989), p. 3.
[3] Catlin, D. H., & Murray, T. H. (1996).
[4] Longman, J. (1998), p. D2; Reuters. (2000b).
[5] Franke, W., & Berendonk, B. (1997); Yesalis, C. E. (2000), pp. 94-98; Swift, E. M., & Yaeger, D. (1999); United States Senate Committee on the Judiciary. (1990), pp. 7, 14.
[6] International Olympic Committee. (2000f).
[7] International Olympic Committee. (2000d). *The Athletes Commission discusses its views biannually with the IOC Executive Board, reports annually to the IOC Session, delegates representatives to other IOC Commissions to present the views of the athletes to these bodies, and establishes Working Groups to act as liaisons with Olympic Organizing Committees*.
[8] Wadler, G. I. (1999).
[9] Gary I. Wadler, M.D., Associate Professor of Clinical Medicine New York University School of Medicine (personal communication, February 25, 2000).

Chapter II

Notes

[1] Leonard, W. M. (1998), p. 8.
[2] Wadler, G. I., & Hainline, B. (1989), p. ix.
[3] U.S. Bureau of the Census. (1995), p. 258.
[4] Miller Lite Report on American Attitudes Towards Sports (as cited in Leonard, W. M. 1998, p. 113).
[5] Leonard, W. M. (1998), pp. 3-21.
[6] Leonard, W. M. (1998), p. 21.
[7] Leonard, W. M. (1998), p. 21.
[8] Leonard, W. M. (1998), p. 8.
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Chapter VI

Notes

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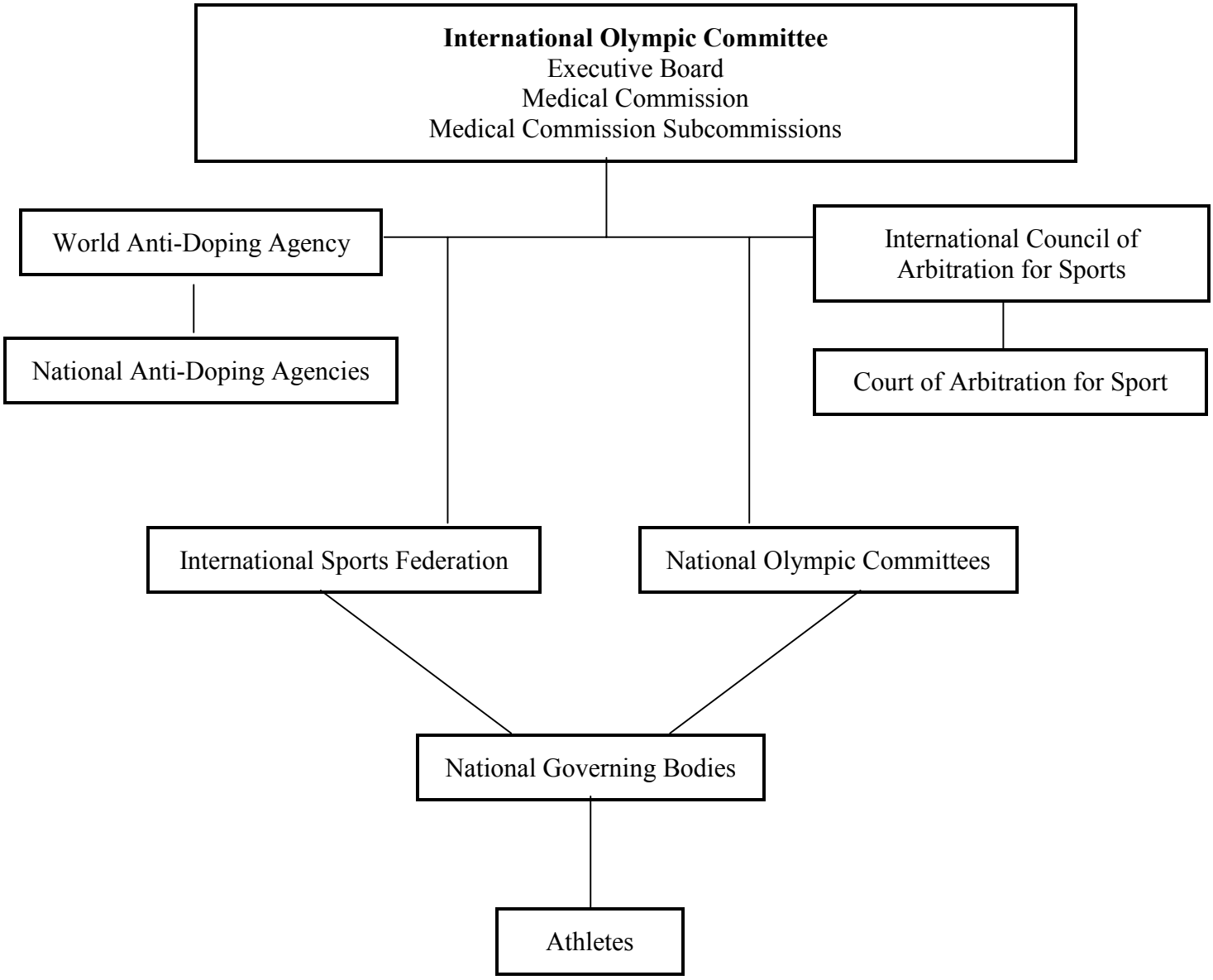
Appendix A
Organization of International Sports



Appendix B
Summary of Drug Testing Regulations

League: **US Olympic Committee/International Olympic Committee**

US Olympic Committee Drug Control Administration
International Olympic Committee Doping Control Program

In-Competition Testing Program	YES
Out-of-Competition Testing Program	YES
No Advance Notice Testing Program	YES
Selection Criteria for Testing	All sports are subject to testing. The IOC Medical Commission, with the cooperation of the International Federation concerned and the Organizing Committee, decide the number of competitors to be subjected to testing per day in each sport. The capacity of the laboratory is given due consideration. In general, testing will include the first four competitors in the final classification and others chosen at random. The USOC, in cooperation with national sports governing bodies, follows similar parameters for in-competition testing and randomly selects athletes from an eligible pool for No Advance Notice testing.
Substances Specifically Banned	See Appendix B (Olympic Movement Anti-Doping Code) for specific substances. Prohibited classes of substances include: stimulants, narcotics, anabolic agents, diuretics, marijuana, and peptide and glycoprotein hormones and analogues. Blood doping and pharmacological, chemical, and physical manipulation of urine is prohibited. Drugs subject to certain restrictions include: alcohol, local anesthetics, corticosteroids, and beta-blockers.

Penalty for First Infraction	In compliance with due process requirements and procedures, disqualification if the infraction occurred during competition, plus:

	a) In cases of a positive result for ephedrine, phenylpropanololamine, pseudoephedrine, caffeine, strychnine and related compounds, a maximum suspension of three months. b) Except in the cases covered by (a) above, a suspension from all competition for two years. If such competitor is a member of a team, the match during which the infraction took place shall be considered forfeited by that team.
Penalty for Second Infraction	a) In cases involving ephedrine, phenylpropanolamine, pseudoephedrine, caffeine, strychnine, and related compounds, disqualification if the infraction occurred during a competition plus a two year suspension. b) Except those cases described in (a), disqualification if the infraction occurred during a competition plus a lifetime suspension from all Olympic competition.
Penalty for Third (+) Infraction	a) In cases involving ephedrine, phenylpropanolamine, pseudoephedrine, caffeine, strychnine, and related compounds, lifetime suspension from all Olympic competition. b) Not applicable in all other cases.
Possibility for Reinstatement	Not specified.
Criteria for Reinstatement	Not specified.
Treatment Options	Not specified. The USOC has a drug reference line and education services available for athletes, administrators, coaches, trainers, and other involved parties.
Other Considerations	The USOC cooperates with a variable number of other countries through the mechanism of bi-lateral (or multi-lateral) drug control agreements. It also cooperates with the National Collegiate Athletic Association (NCAA) and the National Football League (NFL) in an on-going joint research funding venture.

League: International Amateur Athletic Federation

In-Competition Testing Program	YES
Out-of-Competition Testing Program	YES
No Advance Notice Testing Program	YES
Selection Criteria for Testing	*In-Competition:* Selection is generally on a final position and/or random basis. Selection of further athletes may be ordered at the discretion of the IAAF, the doping Control Official, or the Doping Delegate by any method that it or he/she chooses. Testing will also be conducted on any athlete who is deemed to have broken or equaled an Area or World Record. *Out-of-Competition:* Individual or groups of athletes may be tested at the discretion of the IAAF.
Substances Specifically Banned	Prohibited classes of substances include: anabolic agents; amphetamines; peptides, glycoprotein hormones and analogues; cocaine; other stimulants; and narcotic analgesics. Prohibited methods include use of blood doping (e.g. erythropoietin) and urine manipulation techniques (e.g. diuretics, probenecid, bromantan, etc.).
Penalty for First Infraction	Player ineligible for a minimum of two years for infractions involving the use of anabolic agents (androgenic anabolic steroids, beta-2-agonists); amphetamines; peptide, glycoprotein, and glucocorticosteroid hormones and analogues; cocaine; and prohibited techniques (blood doping, erythropoetin, epitestosterone). Player given a public warning and is disqualified from the competition at which the sample was collected for infractions involving the use of sympathomimetic amines and narcotic analgesics.
Penalty for Second Infraction	Player ineligible for life for infractions involving the use of anabolic agents (androgenic anabolic steroids, beta-2-agonists); amphetamines;

	peptide, glycoprotein, and glucocorticosteroid hormones and analogues; cocaine; and prohibited techniques (blood doping, erythropoetin, epitestosterone). Player ineligible for two years (from the date of provision of the sample) for infractions involving the use of sympathomimetic amines and narcotic analgesics.
Penalty for Third (+) Infraction	Player ineligible for life for infractions involving the use of sympathomimetic amines and narcotic analgesics.
Possibility for Reinstatement	YES for time-specified periods of ineligibility. NO for lifetime ineligibility.
Criteria for Reinstatement	Once an athlete's period of ineligibility has expired, he/she will become automatically re-eligible provided: a) He/she has tested negatively for out-of-competition testing conducted at any time during the period of ineligibility and immediately prior to the end of the suspension period; if suspension was for two years or more, athlete must also test negative for a minimum of three tests during this period with at least four months between each test. b) He/she has made satisfactory report on the circumstances surrounding the doping offense to his/her National Federation. c) The appropriate National Federation has submitted its report on the case to the IAAF.
Treatment Options	None specified.

League: International Cycling Union/Union Cycliste Internationale

In-Competition Testing Program	YES
Out-of-Competition Testing Program	YES
No Advance Notice Testing Program	YES

Selection Criteria for Testing

**Testing criteria differ depending on type of race

Mandatory at the following events:

a) World Championships, Continental Championships and Regional Games

b) World record and continental record attempts

c) Any other event of the world and continental calendars designated by the Antidoping Commission

The UCI Antidoping Commission, for each event, instructs the Inspector to select up to 10 riders to be tested.

When no such instructions are issued, the following riders shall be tested:

I) One-Day events (all disciplines):

a) General Rule:
   1) First rider placed
   2) Two riders selected at random

b) Half-stages:
   1) First rider placed in the first half-stage
   2) First rider placed in the second half-stage
   3) A rider selected at random from each half-stage

c) Team events:
   1) Rider selected at random from the first place team
   2) Two riders selected at random from all other teams

II) Stage events (all disciplines, including prologue):

a) General Rule:
   1) First rider placed in the stage
   2) First rider in the general classification after the stage
   3) Two riders selected at random

b) Team Time Trial stage:
   1) Rider selected at random from the first team placed
   2) First rider in the general classification after the stage
   3) Two riders selected at random from all other teams

c) Half-stage:
   1) First rider placed in the first half-stage
   2) First rider placed in the second half-stage
   3) First rider in the general classification after the second half-stage

III) Specific Time-trial events:

a) Individual:
   1) First three riders placed
   2) Two riders selected at random

b) Team:
   1) One rider selected at random from the first team placed
   2) One rider selected at random from the second team placed
   3) One rider selected at random from each of four other different teams selected at random

IV) Track events (all disciplines):

a) Individual:
   1) First rider placed
   2) Three riders selected at random

b) Team:
   1) One rider seleted at random for the first team placed
   2) Three riders selected at random from all the other teams

V) Six-day events:

a) One rider selected at random from the team placed first

b) Three riders selected at random from various other teams

Substances Specifically Banned

Prohibited classes of substances include: stimulants, narcotics, anabolic agents (androgenic anabolic steroids and nonsteroidal anabolic agents), masking agents and peptide hormones and analogues. Blood doping and pharmacological, chemical or physical manipulation are prohibited as well. Corticosteroids and local anaesthetics are subject to certain restrictions. Marijuana is prohibited in the "downhill" mountain bike discipline at levels exceeding 40 nanograms/milliliter.

Penalty for First Infraction

**Disciplinary measures vary by *level of competition* and *gender*.

I) Elites:

a) Men:
   1) Disqualification and suspension for six months minimum to one year maximum
   2) Fine of SFr. 2,000 minimum to SFr. 4,000 maximum
   3) Loss of 50 points in individual classification

b) Women:
   1) Disqualification and suspension for six months minimum to one year maximum
   2) Fine of SFr. 1,000 minimum to SFr. 2,000 maximum
   3) Loss of 20 points in individual classification

II) Under 23:

a) Disqualification and suspension for six months minimum to one year maximum

b) Fine of SFr. 500 minimum to SFr. 1000 maximum

c) Loss of 20 points in individual classification

III) Other riders:

a) Disqualification and suspension for six months minimum to one year maximum

Penalty for Second Infraction

I) Elites:

a) Men:
   1) Disqualification and suspension for one year minimum to two years maximum
   2) Fine of SFr. 4,000 minimum to SFr. 6,000 maximum
   3) Loss of 75 points in individual classification

b) Women:
   1) Disqualification and suspension for one year minimum to two years maximum
   2) Fine of SFr. 3,000 minimum to SFr. 5,000 maximum
   3) Loss of 30 points in individual classification

II) Under 23:

a) Disqualification and suspension for one year minimum to two years maximum

b) Fine of SFr. 1,500 minimum to SFr. 3,000 maximum

c) Loss of 20 points in individual classification

	III) Other riders: a) Disqualification and suspension for one year minimum to two years maximum
Penalty for Third (+) Infraction	I) Elites: a) Men: 1) Disqualification and permanent debarment 2) Fine of SFr. 8,000 b) Women: 1) Disqualification and permanent debarment 2) Fine of SFr. 8,000 II) Under 23: a) Disqualification and permanent debarment b) Fine of SFr. 8,000 III) Other riders: a) Disqualification and permanent debarment
Possibility for Reinstatement	None specified.
Criteria for Reinstatement	None specified.
Treatment Options	None specified.
Other Considerations	For team events, a positive test for a single rider will result in the disqualification of the entire team. Special sections on the list of doping agents carry distinct penalties (refer to text on UCI antidoping regulations). A first offense is committed after a three-year offense-free period where an offense is defined to be a positive result, fraud, or an attempted fraud.

A second offense shall be deemed to be committed if within a three-year period following the first.

A third offense shall be any offense committed after two other offenses, regardless of the period that may have elapsed between them.

League: U.S. Soccer Federation/Federation Internationale de Football Association (FIFA)

In-Competition Testing Program	YES
Out-of-Competition Testing Program	YES
No Advance Notice Testing Program	NO
Selection Criteria for Testing	Two players from each team in every match in which doping tests are to be carried out are randomly selected for testing. In 1998 World Cup Competition (France), for each match, four players were selected randomly for possible testing but only the first two players were actually tested. The remaining two players were tested only in cases of injury to either of the first two players. These selection procedures may change with the next World Cup competition. Reasonable cause as determined by FIFA Commissioner and/or referee of the match.
Substances Specifically Banned	Classes of substances prohibited include: stimulants, narcotic analgesics, anabolic steroids, diuretics, peptide and glycoprotein hormones and related substances. Blood doping and pharmacological, chemical and physical manipulation methods are also prohibited. Substances subject to partial restriction include: alcohol, beta blockers, local anesthesthetics, and corticosteroids.
Penalty for First Infraction	Determined by Organizing Committee; dealt with on a case-by-case basis**.**
Penalty for Second Infraction	Determined by Organizing Committee; dealt with on a case-by-case basis.
Penalty for Third (+) Infraction	Determined by Organizing Committee; dealt with on a case-by-case basis.
Possibility for Reinstatement	None specified.
Criteria for Reinstatement	None specified.

Treatment Options	None specified. Drug Education program being considered.
Other Considerations	Matters not provided for in the regulations shall be decided by the Organizing Committee.

Appendix B
Olympic Movement Anti-Doping Code
Prohibited Classes of Substances and Prohibited Methods
April 1, 2000

I. Prohibited Classes of Substances

A. **Stimulants** - Prohibited substances in class (A) include the following examples: amineptine, amiphenazole, amphetamines, bromantan, caffeine,* carphedon, cocaine, ephedrines,** fencamfamin, mesocarb, pentetrazol, pipradrol, salbutamol,*** salmeterol, terbutaline and related substances.

NOTE: All imidazole preparations are acceptable for topical use. Vasoconstrictors may be administered with local anaesthetic agents. Topical preparations (e.g., nasal, ophthalmological, rectal) of adrenaline and phenylephrine are permitted.

* For caffeine, the definition of a positive is a concentration in urine greater than 12 micrograms per millilitre.
** For cathine, the definition of a positive is a concentration in urine greater than 5 micrograms per millilitre. For ephedrine and methylephedrine, the definition of a positive is a concentration in urine greater than 10 micrograms per millilitre. For phenylpropanolamine and pseudoephedrine, the definition of a positive is a concentration in urine greater than 25 micrograms per millilitre.
*** Permitted by inhaler only to prevent and/or treat asthma and exercise-induced asthma. Written notification of asthma and/or exercise-induced asthma by a respiratory or team physician is necessary to the relevant medical authority.

B. **Narcotics -** Prohibited substances in class (B) include the following examples: buprenorphine, dextromoramide, diamorphine (heroin), methadone, morphine, pentazocine, pethidine and related substances.

NOTE: Codeine, dextromethorphan, dextropropoxyphene, dihydrocodeine, diphenoxylate, ethylmorphine, pholcodine, propoxyphene and tramadol are permitted.

C. **Anabolic agents** - Prohibited substances in class (C) include the following examples:
1. Anabolic androgenic steroids
   a. clostebol, fluoxymesterone, metandienone, metenolone, nandrolone, 19-norandrostenediol, 19-norandrostenedione, oxandrolone, stanozolol and related substances
   b. androstenediol, androstenedione, dehydroepiandrosterone (DHEA), dihydrotestosterone, testosterone,* and related substances.

Evidence obtained from metabolic profiles and/or isotropic ratio measurements may be used to draw definitive conclusions.

* The presence of testosterone (T) to epitestosterone (E) ratio greater than six (6) to one (1) in the urine of a competitor constitutes an offense unless there is evidence that this ratio is due to a physiological or pathological condition, e.g., low epitestosterone excretion, androgen producing tumor, enzyme deficiencies. In the case of T/E greater than 6, it is mandatory that the relevant medical authority conducts an investigation before the sample is declared positive. A full report will be written and will include a review of previous tests, subsequent tests and any results of endocrine investigations. In the event that previous tests are not available, the athlete should be tested unannounced at least once per month for three months. The results of these investigations should be included in the report. Failure to cooperate in the investigations will result in declaring the sample positive.

2. Beta-2 agonists - bambuterol, clenbuterol, fenoterol, formoterol, reproterol, salbutamol,* salmeterol,* terbutaline* and related substances.

   * Authorized by inhalation as described in Article (I.A.).

   For salbutamol, the definition of a positive under the anabolic agent category is a concentration in urine greater than 1000 nanograms per millilitre.

D. Diuretics - Prohibited substances in class (D) include the following examples: acetazolamide, bumetanide, chlortalidone, etacrynic acid, furosemide, hydrochlorothiazide, mannitol,* mersalyl, spironolactone, triamterene and related substances.

   * Prohibited by intravenous injection.

E. Peptide hormones, mimetics and analogues - Prohibited substances in class (E) include the following examples and their analogues and mimetics:
   1. Chorionic Gonadotrophin (hCG) prohibited in males only;
   2. Pituitary and synthetic gonadotrophins (LH) prohibited in males only;
   3. Corticotrophins (ACTH, tetracosactide);
   4. Growth hormone (hGH);
   5. Insulin-like Growth Factor (IGF-1);

      and all the respective releasing factors and their analogues;

   6. Erythropoietin (EPO);
   7. Insulin;

      permitted only to treat athletes with certified insulin-dependent diabetes. Written certification of insulin-dependent diabetes must be obtained from an endocrinologist or team physician.

      The presence of an abnormal concentration of an endogenous hormone in class (E) or its diagnostice marker(s) in the urine of a competitor constitutes an offense unless it has been proven to be due to a physiological or pathological condition.

II. Prohibited Methods

The following are prohibited:
1. Blood doping;
2. Adminstering artificial oxygen carriers or plasma expanders;
3. Pharmacological, chemical and physical manipulation.

III. Classes of Prohibited Substances in Certain Circumstances

A. **Alcohol** - Where the rules of a responsible authority so provide, tests will be conducted for ethanol.

B. **Cannabinoids** - Where the rules of a responsible authority so provide, tests will be conducted for cannabinoids (e.g., Marijuana, Hashish). At the Olympic Games, tests will be conducted for cannabinoids. A concentration in urine of 11-nor-delta 9-tetrahydrocannabinol-9-carboxylic acid (carboxy-THC) greater than 15 nanograms per millilitre constitutes doping.

C. **Local anaesthetics** - Injectable local anaesthetics are permitted under the following conditions:
   a. bupivacaine, lidocaine, mepivacaine, procaine and related substances, can be used but not cocaine. Vasoconstrictor agents may be used in conjunction with local anaesthetics;
   b. only local or intra-articular injections may be administered;
   c. only when medically justified.

   Where the rules of a responsible authority so provide, notification of administration may be necessary.

D. **Glucocorticosteroids** - The systemic use of glucocorticosteroids is prohibited when administered orally, rectally or by intravenous or intramuscular injection.

E. **Beta-blockers** - Prohibited substances in class (E) include the following examples: acebutolol, alprenolol, atenolol, labetalol, metoprolol, nadolol, oxprenolol, propranolol, sotalol and related substances.

   Where the rules of a responsible authority so provide, tests will be conducted for beta-blockers.

Summary of Urinary Concentrations Above Which
IOC Accredited Laboratories Must Report Findings for Specific Substances

caffeine	> 12 micrograms/millilitre
carboxy-THC	> 15 nanograms/millilitre
cathine	> 5 micrograms/millilitre
ephedrine	> 10 micrograms/millilitre
epitestosterone	> 200 nanograms/millilitre
methylephedrine	> 10 micrograms/millilitre
morphine	> 1 microgram/millilitre
19-norandrosterone	> 2 nanograms/millilitre in males
19-norandrosterone	> 5 nanograms/millilitre in females
phenylpropanolamine	> 25 micrograms/millilitre
pseudoephedrine	> 25 micrograms/millilitre
salbutamol	
(as stimulant)	> 10 nanograms/millilitre
(as anabolic agent)	> 1000 nanograms/millilitre
T/E ratio	> 6

IV. Out-of-Competition Testing

Unless specifically requested by the responsible authority, out-of-competition testing is directed solely at prohibited substances in class I.C. (Anabolic Agents), I.D. (Diuretics), I.E. (Peptide Hormones, Mimetics and Analogues) and II (Prohibited Methods).

Appendix C

Recommended Adjudication Process for the USADA as Delineated by The USOC Select Task Force on Drug Externalization*

1. The United States Anti-Doping Agency (USADA) shall notify the athlete of an adverse finding or a presumed positive of the A sample. Notification should include the name(s) and quantity of the detected substance(s). The athlete or his/her representative will have the opportunity to attend the analysis of the B sample.

2. In cases of an adverse finding, e.g., elevated Testosterone/Epitestosterone ("T/E") ratio, the USADA shall conduct any further investigation and make a determination confirming the test.

3. The USADA shall commence a doping related infraction case upon any one of the following circumstances: a confirmed adverse finding or presumed positive (B confirmation of the A sample), an athlete's refusal or failure to comply with a doping control test, a written admission of a doping infraction, or a request for a determination based upon evidence of a doping infraction made by a recognized sport organization (such as a national or international sport governing body, a major sports organization or the national anti-doping organization of another country), Upon commencement of a case, the USADA shall immediately notify the athlete of the particulars of the infraction by certified letter, overnight delivery service with a signed receipt or by personal service.

4. Upon commencement of a case, the USADA shall convene a panel of three impartial individuals (the "Review Panel") to review evidence of a doping related infraction and to make a determination as to whether there is probable cause for a finding of a doping related infraction. This review shall be done in the strictest confidence. The USADA shall develop and maintain a list of impartial individuals who are expert in the field of drug testing, sport science, medicine, legal matters and ethics who shall be available to serve on the Review Panel. The Review Panel shall be paid on a per case basis.

5. The standard documentation package shall be furnished to the Review Panel for its review. This information shall also be furnished to the athlete. The Review Panel may request additional material if it determines that such material would be helpful to it in its deliberations. The athlete may submit a written statement to the Review Panel, but shall have no right to otherwise appear before or participate in the Review Panel's deliberations.

6. The Review Panel shall either find probable cause that a doping related infraction has occurred or that the case be closed and no further action be taken. All decisions of the Review Panel shall be by majority vote. The Review Panel shall inform the USADA and the athlete of its decision in writing. This finding shall not be admitted into evidence in any subsequent hearing.

7. Upon a finding of probable cause, the athlete may either admit the doping infraction or deny the doping infraction. If the doping infraction is admitted, the USADA will forward the admission, including the sanction to be imposed, to the USOC, and to the appropriate National Governing Body (NGB) and International Federation (IF) for action.

8. If the doping infraction is denied, the matter shall be set for a hearing. A standard documentation package compiled by the testing laboratory shall immediately be forwarded to all participating parties.

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* *Source: Report of the USOC Select Task Force on Drug Externalization, December 3, 1999.*

9. The USADA shall prosecute all doping infraction cases.

10. The American Arbitration Association (AAA), in conjunction with the local arm of the Court of Arbitration for Sport (CAS), shall be responsible for the administration of doping infraction hearings in the United States. The AAA and CAS shall develop a process for the administration of doping infraction cases that satisfies both organizations. The AAA and CAS shall establish a pool of arbitrators that is approved by both organizations. The AAA/CAS shall be responsible for setting hearing dates and locations. The AAA/CAS shall make provisions for having an expedited hearing process.

11. Three arbitrators (the "Hearing Panel") shall be empanelled to hear each case. Selection of the arbitrators shall be conducted in such a way so as to provide for agreement of the parties on the arbitrators or for the opportunity to strike arbitrators. The Hearing Panel shall decide all issues relating to discovery, motions and other procedural matters. The Hearing Panel may, on its own initiative, appoint a scientific expert as a "friend of the court."

12. In all cases, the USOC and the NGB shall be bound by the determination of the hearing panel.

13. The appropriate IF shall be notified of the hearing. The IF shall be invited to participate in the hearing. The IF can appear, but take no part, on behalf of the athlete or on behalf of the USADA. If the IF chooses to appear, it shall be bound by the determination of the Hearing Panel.

14. An individual accused of a doping infraction shall be afforded fair notice and an opportunity for a hearing. The burden and standard of proof shall be determined by the Hearing Panel upon consideration of the particulars of the case. All decisions of the Hearing Panel shall be by majority vote.

15. The USADA shall maintain confidentiality of all matters pertaining to a positive test or adverse finding until completion of the hearing process, unless the athlete requests public disclosure. Upon completion of the hearing process, all findings shall be made public. The USADA may issue periodic public reports indicating the number of positive tests and adverse findings.

16. If the Hearing Panel finds a doping infraction, it will then consider the penalty to be imposed, taking into consideration the rules of the appropriate NGB and IF. The Hearing Panel will forward its decision, including the recommended sanction to be imposed, to the USOC and to the appropriate NGB and IF for action.

17. The decision of the Hearing Panel shall be communicated to all parties in writing.

18. Any party to the hearing may appeal the Hearing Panel's decision to the CAS, which shall then hear the case *de novo* and pursuant to its procedures (a CAS appeal arbitration proceeding).

Appendix D
Recommendations Addressing Regulatory Issues from Experts in Athlete Doping Control

In May 1999, the Duke University School of Law released a report that attempted to address the broad societal concerns regarding athlete drug use, and provide an agenda for organizations that wish to tackle the issue of drugs in sport. The conference included experts in the fields of law, ethics, sociology, education, medicine, and athletics, and members of the affected sports organizations, including athletes and officials, and their corporate sponsors. Special emphasis was placed on: (1) independence and the structure that independent governance of drug testing programs might take; (2) the science of doping and doping control; and (3) the legal concerns of accused athletes and governing organizations in maintaining effective doping control. The recommendations from this conference reflect the most current independent expert opinions regarding the necessary legal components of an anti-doping agency or program. These recommendations were:

- The adjudication process should be entirely independent of the governing bodies. The governing bodies should have an educational role, informing athletes of the dangers of doping and of the ethical foundation of sports. National governing bodies should not be placed in an adversarial role vis a vis their athletes in doping cases.

- The adjudication process must include the following safeguards: (1) prosecutions will be based on scientifically determined violations, (2) all prohibited substances must be detectable in the athlete's urine or body fluids through a method that is scientifically valid, and (3) all prohibited substances must be banned on the basis of research that takes into consideration such relevant factors as ethnicity, age, gender, and medical history.

- The adjudication process should proceed in three distinct stages:

1) There should be a preliminary review by a panel composed of relevant experts, including physicians, other scientists, and lawyers. The purpose of this review is to determine (a) if all procedures were followed for collection, storage, transportation, and testing of the athlete's sample and, (b) if based on the laboratory report, the results of the analysis are sufficiently strong evidence of the athlete's guilt. During this preliminary stage of the proceedings, the identity of the athlete is held strictly confidential. If the review panel finds that the published mandatory procedures for the collection, storage, transportation, and testing of the sample were not strictly followed, it must declare the sample invalid and end the process. If the review panel determines that the collection, storage, transportation, and testing of the sample complied fully with the rules, and that the analysis provides sufficiently strong evidence of the athlete's guilt, it will forward the case for prosecution. At that point, there may be a rebuttable presumption of the athlete's guilt. The independent anti-doping agency or program will be responsible for the prosecution of all doping cases. The review panel will make periodic public reports of the number of cases dismissed in this manner, and the basis for each dismissal. The names of the athletes involved will not be disclosed.

2) The determination of whether a doping violation took place must be decided by qualified decision makers. There are currently two possible models. The first is the American Arbitration Association (AAA). One of the advantages of the AAA is its familiarity and suitability for emergency disputes. The second is the International Court of Arbitration for Sport (CAS). One of the advantages of the CAS is its potential international acceptance, and thus potential for finality.

One of the most important criterion for the body ultimately selected to decide the merits of cases is the employment of adjudicators with experience deciding contested scientific disputes.

There must be regularized procedures for all hearing panels. Panels must publish all decisions, and the bases for decision. If the CAS is used, it would have to establish regional panels to streamline the process.

There must be a process for providing counsel to athletes accused of a doping violation. This might be accomplished through a Judge Advocate General-type structure, which would provide both the prosecutors and the defense counsel, under the direction of an independent overseer. Another possibility is the reliance on pro bono counsel. A third possibility is the use of an approved list of counsel. In the end, some combination of these three might be employed.

One issue left unresolved was at what point an athlete should be suspended. There was agreement that liability should not attach before a suspicious sample was confirmed by a second analysis of the sample. There was some support for this confirming analysis being done by a different laboratory than the one that performed the initial analysis. There also was support for the athlete's early involvement in the preliminary stage of the process, to raise limited compliance issues before the review panel. There was not agreement about whether this would constitute a hearing for purposes of the Amateur Sports Act, which bars a suspension prior to a hearing.

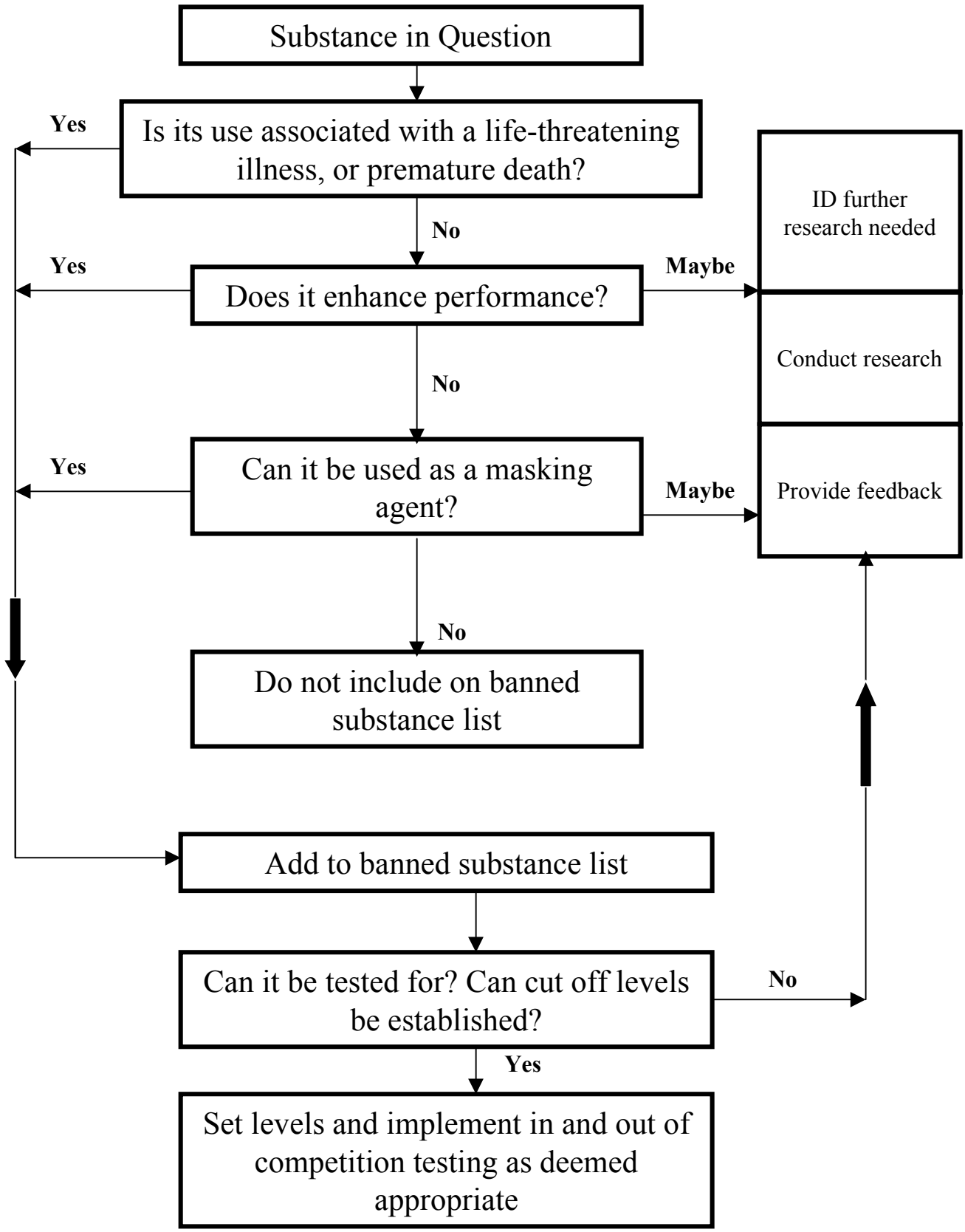
There was agreement that an athlete's certification of the sample collection procedures could be used against him or her in a contested hearing, although the athlete still could challenge the collection. For this reason, one of the important functions of the national governing body would be the education of its athletes in the process and their rights under the program.

3) The final stage of the process involves proceedings in the athlete's national courts or before international federations.

There was agreement that a credible and bona fide arbitration process as outlined above would result in minimizing the role of civil courts. There was also agreement on the need for harmonization among the rules of the various federations to which an athlete might be subject. Any obligation that a national governing body had for doping disputes under the rules of its international federation would have to be delegated to the independent doping agency. Thus, a sample tested outside the United States would be subject to the same preliminary compliance review that a sample generated in the United States would receive. And the failure to follow the requirements for the collection, storage, transportation, and testing of the sample by the foreign entity would result in the sample being declared invalid.

Appendix E

Proposed Banned Substance Decision Process



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